



**ASSESSMENT OF BUTTER PRODUCTION, CONSUMER AND MARKET
PREFERENCES, QUALITY AND PRICES IN KINDDO DIDAYE OF
WOLAITA ZONE, SOUTHERN ETHIOPIA**

MSc Thesis

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College of Agriculture

Hawassa, Ethiopia

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APPROVAL SHEET

HAWASSA UNIVERSITY COLLEGE OF AGRICULTURE

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As members of the Examining Board of the Final MSc Open Defense, we certify that we have read and evaluated the thesis prepared by Amanuel Elias entitled “Assessment of Butter Production, Consumer and Market Preferences on its Quality and Prices in Kinddo Didaye of Wolaita Zone, Southern Ethiopia” and recommend that it be accepted as fulfilling the thesis requirement for the degree of Masters of science in **Animal production**

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DEDICATION

I dedicate this thesis manuscript to my father ELIAS LOTA, and my mother ALMAZ LAMARO for nursing me with affection and love and for their dedicated partnership in the success of my life.

STATEMENT OF THE AUTHOR

I declare that this thesis is my bonafied work and all sources of materials used for this thesis have been duly acknowledged. I solemnly declare that this thesis is not submitted to any other institution anywhere for the award of any academic degree, diploma, or certificate.

Name:.....**Signature:**.....

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Date of Submission:

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ABBREVIATIONS AND ACRONYMS

ANOVA	Analysis of Variance
ATVET	Agricultural Technical and Vocational Education Training
BOLF	Bureau of Livestock and Fishery
CSA	Central Statistics Agency
E.C	Ethiopian Calendar
ETB	Ethiopian Birr
FAO	Food Agricultural Organization
FTC	Farmers Training Centre
GDP	Gross Domestic Product
GOE	Government of Ethiopia
HH	Household Head
IDP	Integrated Development Plan
IGAD	Intergovernmental Authority on Development
L	Litter
LMP	Livestock Master Plan
LIVES	Livestock and Irrigated Value Chains for Ethiopian Smallholders
ILRI	International livestock Research Institute

IPMS	Improving Productivity and Market Success
Kg	Kilo gram
MOA	Ministry of Agriculture
SARI	Southern Agricultural Research Institute
SE	Standard Error
SEM	Standard Error Mean
SNNPR	Southern Nations, Nationalities and Peoples Region
SPSS	Statistical Package for Social Sciences
SSA	Sub- Saharan Africa
TLU	Tropical livestock unit
UK	United Kingdom
WBISPP	Woody Biomass Inventory and Strategic Planning Project
X^2	Pearson chi-square

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Assessment of Butter Production, Consumer and Market Preferences on its Quality and Prices in Kinddo Didaye of Wolaita Zone, Southern Ethiopia

By Amanuel Elias Lota

Major Advisor: Sintayehu Yigrem (PhD), Co-Advisor: Mestawet Taye (PhD)

ABSTRACT:

*The study was conducted at Kinddo Didaye district, Wolaita zone southern Ethiopia with the objective of assessing butter production, consumer and market preferences, quality and prices in the area. Based on data collected between April to July 2019. The effect of agro ecology on butter production was analyzed. A multistage sampling procedure was employed to select representative kebeles and households from Kinddo Didaye district. To conduct the study, one sample district (Kinddo Didaye) was purposively based on dairy cow potentiality and butter production. Six kebeles were selected in total (three from midland and three kebeles from lowland). 138 butter producing households were purposively selected based on dairy cow production and butter production from the study district. Besides this different 40 retailers, 10 butter shops and 50 consumers were interviewed. Local cattle are the most dominant milking cows were kept by all six kebeles. Both qualitative and quantitative data were collected, involving household survey. Thus, all (100%) of the respondents were reported that clay pot churn is tool used for butter making. For washing and smoking milk equipments, plant leaves such as *Ocimum hardiense* (68.1%) and *Cymbopogan martini* (23.9%) were mostly used in both agro-ecologies. For butter averagely 3.0 ± 0.12 and 2.91 ± 0.01 volume of milk churned at a time in both lowland and midland agro-ecologies respectively. In addition, 17.92 ± 0.13 and 15.04 ± 0.09 liters of milk in both lowland and midland agro-ecologies respectively were used to produce 1kg of butter. Retailers and consumers got quality butter from producer; The destinations of the butter were to different areas in the country, mainly Wolaita Soddo, Hawassa, Addis Abeba and others. All assembler/butter shops sell butter by their shops. Consumers report shows that the quality attributes of butter preferable by consumers were 44% flavor, 32% texture, 20% color and remaining 4% fermentation in study district. The price of butter rise during holy days, non-fasting period and dry season. The challenges of butter production in the area were feed shortage, shortage of grazing area, dry season, price fluctuation and fasting season. The major type of adulteration that reported by consumers were 62.5% banana and 37.5% 'shenolega' in the study area.*

Key words: Agro-ecology, butter, butter production, butter marketing, butter consumption

1. INTRODUCTION

The livestock subsector has an enormous contribution to Ethiopia's national economy and livelihoods of many Ethiopians, and still promising to rally round the economic development of the country. According to Bilatu *et al.* (2013), in Ethiopia, the raw milk and milk products are consumed directly and may contribute for public health hazards with transmission of various diseases. Earlier reports by Ashenafi (2006); Asaminew and Eyasu (2011); Alganesh and Fekadu (2012) and Amistu *et al.*(2015), revealed that sanitary conditions during production, processing and handling of milk and milk products in different parts of Ethiopia were substandard and the quality and safety of milk products is in questionable. Such quality and safety problems in extreme cases can bring negative impact on the food security status of the country. Another reports by FAO (2011), indicated that in addition to the quality and safety concerns, poor handling and processing practices of milk and milk products causes post harvest losses. Food safety and qualities are an emerging concern throughout the world especially from human health point of view and with this regard; most countries are employing quality control programs for all foods including animal products (Elziney and Alturki, 2007). The same authors also indicated that, food quality can be reflected as a distinctive characteristic of food that decides its value or acceptability to consumers.

In order to reduce the quality and safety problems of milk, human being have long been preserved dairy products during high milk production period through curdling, cheese making, butter making and create the potential for trade (Inayat *et al.*, 2003). Similar study by Lemma *et al.* (2004), revealed that milk produced in different parts of the country is either consumed directly or processed in to varies shelf stable products such as whole sour milk (ergo), butter (kibe), soured skimmed milk (arera) and cottage cheese (ayib).

Butter is one of the many dairy products being processed and consumed around the world. Worldwide butter is made from a variety of animal milk including cow, goat, camel, buffalo and sheep. According to Yonad (2009), in Ethiopia at household level, butter is made, processed and sold by women in every community and it has moisture content ranges from 20 to 43% and spoilage occur when stored at room temperature for a long time is perhaps by putrefactive microorganisms. Butter has long shelf life as compared to fresh milk, especially when heated to higher temperature (100-120°C) for 30 minutes and it can also stay for several months without spoilage (Lejko *et al.*, 2009). Butter is one of the primarily fat sources and an important source of dietary energy. Besides fats, butter also contains small percentages of proteins, milk sugar and water which make it a suitable substrate for microorganisms (Mahendra *et al.*, 2016).

Dairy production among the sectors of livestock production system is a very important issue in Ethiopia where livestock and its products are important source of food and income and dairying has not been fully exploited and promoted in the country for years or decades. At present the dairy sector is expanding rapidly through intensification and expansion of smallholder milk production. To be effective, the efforts to improve the productivity of smallholder dairy production and improve its market orientation needs to be supported and informed by detailed understanding of the current and dynamic conditions of production, marketing, processing, and consumption of milk and dairy products (Asfaw, 2009).

Many countries have experienced very fast development in dairy sector in or around largest urban center, responding immediately the market. This system is contributing immensely towards filling in the large demand supply gap for milk and milk products in urban centres, where conception of milk products is remarkably high (Alemu, 1998).

In Ethiopia, there are two types of butter, ripened/rancid and fresh (Mekedes, 2008). However, Abebe *et al*, (2013) reported that there are three types of butter in Ethiopia, namely refer to fresh, semi-rancid and rancid butter, respectively, based on the degree of lipolysis of butter. Butter making and processing is solely done by women in every community in Ethiopia. Butter has an attractive appearance with a white to light yellowish color. Like factory processed butter, locally produced butter is semi-solid at room temperature. It has a pleasant odor when fresh, but with an increasing storage time, changes will occur in odor and taste, unless refrigerated or further processed into traditional ghee by boiling with spices (Lola and Haile, 2015).

Traditional butter production involves extracting fat from the milk. It is produced by churning cream or sour milk, a process which damages the membranes of butterfat found in cream or sour milk resulting in the production of small butter grains. These butter grains float in the water-based portion called buttermilk. The buttermilk is then drained. Finally, the grains are pressed and kneaded together (Gebremedhin *et. al*, 2014).

In Ethiopia, smallholder farmers and pastoralists together produce and supply 98% of the total annual milk production of the country (Yonad, 2009). The vast majority of milk produced outside urban centers in the country is processed into milk products at household level using traditional technologies (Muriuki and Thorpe, 2001). Traditional butter ferments slowly at room temperature, offering rural consumers a readily storable and durable dairy product (GOE, LMP, 2007). For many reasons (limited market outlet, shorter shelf life, and lower price for whole milk as compared to butter and ease of handling and product diversification for consumption) in rural areas, producers are attracted to produce butter (Alganesh, 2002; Ayantu, 2006 and Kassahun, 2008).

Butter is an important source of food (cooking oil), cosmetics and common marketable form of dairy product for per-urban and rural community. Butter produced from whole milk is estimated to have 65% fat and is the most widely consumed milk product in Ethiopia. Of the total milk produced, around 40 percent is allocated for butter while only 9% is for cheese (Mohamed *et al.*, 2003). Butter production is the long-life activity in Kinddo Didaye district; it is also the most common marketable dairy product.

1.1. Statement of the problem

Dairy production, among the sectors of livestock production system, is a crucial issue in Ethiopia where livestock and its products are important source of food and income, and dairying has not been fully exploited and promoted in the country. Despite its huge numbers, the livestock subsector in Ethiopia is low in production. A number of fundamental constraints underlie these outcomes, including traditional technologies, limited supply of inputs (feed, breeding stock, artificial insemination and water), poor or non-existent extension service, high disease prevalence, poor marketing infrastructure, lack of marketing support services and market information, limited credit services, absence of effective producers' organizations at the grass roots levels, and natural resources degradation (Berhanu *et al.*, 2006).

Since Wolaita zone is potential for milk production, processing, marketing and consumption, results of the study become essential to provide vital and valid information for effective research, planning, and policy formulation (Birhanu *et al.*, 2013).

The milk and milk products particularly butter are very prominent commodities on the market; Butter of this district is well known all the way from Wolaita Zone to the capital city of the country Addis Ababa, fetching more prices and acceptable by consumers (Birhanu *et al.*, 2013).

Kinddo Didaye is one district with potential butter source in Wolaita zone, and provides butter to consumer and market of the district and Wolaita Soddo town. But there were not well studied or documented information, why the market and consumer prefer this butter, quality attributes and butter production in study area.

Even if the areas have good potential in butter and milk production, however information on production, production system and marketing system of butter made from cow milk is not well studied yet in the study area. Therefore, the present study was done to assess the production, production system and marketing and consumer preference of butter in the Kinddo Didaye district.

1.2. GENERAL OBJECTIVE

To assess butter production, consumer and market preference, quality and prices in Kinddo Didaye of Wolaita Zone, Southern Ethiopia

1.2.1. SPECIFIC OBJECTIVES

- ✓ To assess butter production and marketing in the study area
- ✓ To assess market and consumer preference of butter in the study area
- ✓ To assess quality and price of butter in the study area

2. LITERATURE REVIEW

2.1. Butter Production in Ethiopia

Butter is mainly made in traditional production system in Ethiopia. The traditionally produced Ethiopian butter (locally known as kibe) is often prepared by women and is made from soured milk (ergo). To make butter, whole milk is collected in clay pot churn or in a bottle gourd until sufficient amount is collected and soured naturally. Under normal storage conditions, milk sours within 4–5 hours and if the milk is soured, it retards the growth of undesirable organisms and makes separation of fat easier. Before using, the churning material is smoked using plant leaves such as *Olea africana*. The smoking of churn is aimed to add a distinct flavour to the butter and also smoking has a bacteriostatic effect. In average, about 7–10 litres of soured whole milk is filled in churn and then the churn is stoppered with a plug, a false banana leaf, or a piece of skin or leather stretched over the mouth and securely tied and agitated. The churning process starts by agitating the fermented milk. Different agitation methods exist depending on the location. These include: a) the churn is placed on the floor, on a soft pad of material such as sheep skin or straw, tilted at an angle of 75° to the horizontal, and rocked back and forth; b) the churn is hung on a tripod and swung to and fro; c) the churn is rocked on the lap and d) the churn is shaken with both hands. The formation of butter is detected by a change in the sound of the milk. Formation of the butter grains is checked through a hole made at the neck of the churn by inserting straw into the churn through the vent. Most often a straw is inserted into the churn through the vent: if there are small butter grains adhering to the surface of the straw, the break point has been reached. If the straw is clean, this indicates that the butter granules have coalesced into larger grains. The churn is then rotated on its base and the butter grains, which collect in the centre form lumps of butter which are skimmed off. The butter is then kneaded in cold water and washed to remove visible residual buttermilk. The volume of milk collected per churn ranges

from 5–10 litres, and about 16.5 litres of milk is required to produce 1 kg of butter. Brehanu *et al*, (2014).

Similarly, Zelalem and Ledin (2000), indicated that, traditional butter making requires about 21-25 kg milk to produce 1 kg of butter with moisture content of 83%, Factors such as temperature and acidity of milk influence efficiency of butter making. For instance, if the temperature is too cold, butter formation is delayed and the grains become small and difficult to handle. If the temperature is too high, the yield of butter is reduced because a large proportion of the fat remains in the buttermilk, and the butter will be spongy and of poor quality. Similar study by Eyassu & Asaminew (2014), also revealed that, when sufficient volume of milk (7-8 liters) is collected, it is transferred to a churn made of gourd, clay pot and the churn can be hanged on a tripod and swung to and fro. Another similar study by Francesca *et al*, (2014), indicated that when the milk has soured and sufficient milk has been collected, the clay pot is shaken until butter granules are formed and this method of butter making may take from two to five hours, depending on such factors as temperature, the fat content of the milk, the acidity of the milk and the amount of milk in the clay pot. In general, the traditional butter making methods used in different parts of the country is time consuming and less efficient in terms of fat recovery.

According to O' Mahony (1988), cited in Simon (Hailu, 2012) factors influencing churning time and recovery of butter fat as butter are:

Milk acidity: milk containing at least 0.6% lactic acid is easier to churn. Acidity higher than 0.6% does not significantly influence churning time or fat recovery

Temperature: At low temperatures churning time is long; butter grain formation can take five hours or longer. As churning temperature increases churning time decreases. This becomes

marked at temperatures above 20°C, but as little as 60% of the butter fat may be recovered as butter at 26°C. Sour milk is normally churned at between 15 –26°C depending on environmental temperatures.

Degree of agitation: Increasing agitation reduces churning time. However, the process is temperature dependent and churning at temperatures above 20°C results in short churning times with poor recovery of fat. The optimum churning temperature is between 17 and 19°C.

Extent of filling the churn: churn should be filled one third to half of its volumetric capacity. Filling to more than half the volumetric capacity increases churning time considerably but does not reduce fat recovery.

Churning efficiency is measured in terms of the time required to produce butter granules and by the loss of fat in the buttermilk. Efficiency is influenced markedly by churning temperature and the acidity of the milk or cream. (O'Mahony, 1988, as cited in Simon Hailu, 2012).

The temperature of the cream during churning is of great importance. Cream should be churned at 10–12 °C in the hot season and at 14 –17 °C in the cold season (O' Mahony, 1988, as cited in Simon Hailu, 2012).

2.2. Economic utilities and medicinal value of Butter in Ethiopia

In Ethiopia, butter is exclusively used to make traditional ghee. Fresh/raw butter is used for hair dressing for women as hair cosmetics and as a skin cosmetic by both sexes. A report on the review of Ethiopian dairy sector (Zelalem *et al.*, 2011) revealed that use of butter as hair oil is assumed to have dual functions: for hair dressing and to cure headaches. Butter is also used as ointment and for relief on wounds (Alganesh and Yetenayet, 2017). Similarly, '*Kibe*' is the most shelf stable of all traditionally processed fermented milk products next to '*nitirkibe*'. It is also used for hairdressing and as a skin cosmetic by both sexes. (Mekdes, 2008; Yonad, 2009; Alganesh and Fekadu, 202).

According to study conducted, traditionally made ghee stored for more than a year is recommended for patients to treat chronic coughs. (Alganesh and Fekadu, 2012).

2.2.1. Butter in the Ethiopian Food system

Butter is a traditional food, which is widely consumed all over the world, directly or as an ingredient in a variety of processed foods. Related to its high nutritional value, due to high content of fats, vitamins and minerals, and unique and pleasant flavor, butter is not only expensive but also appreciated by consumers (Pantange *et,al*, 2013). Butter and some dairy products are called yellow fats which contains a number of products spreading on bread or for indirect consumption as ingredients in other foods (Embaye, 2010). Fresh butter is also used by children of weaning age and the elderly (Yonad, 2009). Traditionally, children of weaning age are fed on freshly made butter for different reasons which vary from society to society. In some societies it is believed to help the infants maintain body temperature during cold weather. In other societies, feeding freshly made butter is believed to help infants begin to speak some words earlier during childhood. Fresh butter is also fed to new born babies assuming that it lubricates and facilitates bowel movement to assist ease of discharge of faeces. In a study conducted in the Borena region of Ethiopia, butter was found to be an important source of energy as food for humans, and is used for cooking (Yonad, 2009).

Butter is also used as oil in traditional food preparation: for example, the Ethiopian kibe is used in porridge, enset foods like *kocho*, special soup/wott- which is eaten along with a typical Ethiopian *injera* (a pancake-like bread). Butter, locally called - 'Kibe', has important role in the diet of most Ethiopians, both in rural and urban. In addition to direct consumption as a side dish, it is used as oil for food preparation. It is used for roasting coffee beans that is used for special traditional ceremonies in many parts of southern region (Mekdes, 2008; Yonad, 2009; Alganesh and Fekadu, 2012, Alganesh and Yetenayet, 2017). So, in Ethiopia, out of the total butter produced 80% is used as food ingredient and the rest is used as cosmetics for hair dressing.

Traditional ghee (heated and spiced form of butter) is commonly used for culinary, social functions and therapeutic purposes (Mohammed *et al.*, 1998). A major portion of ghee is utilized for culinary purposes such as a dressing for various foods, cooking and frying of different foods. In Ethiopia, traditional ghee is usually utilized for flavoring and as condiment for different types of pulse stews (lentils, beans and peas), chicken and meat stews and sauces from different species of domestic animals. Particularly no chicken stew is being thought with the absence of ghee, and commonly is an indication of well-being of a family who used ghee in their daily meal. Zelalem *et al.*, (2011) stated that ghee is added to a variety of Ethiopian traditional dishes such as *Kitifo* (minced beef served raw or half cooked) and a variety of cereal, pulse and meat based sauces-*wott*. It is also used in mixture with cottage type cheese and *kochkocha* and served with indigenous diets such as *chumbo and chororsa*. Traditional ghee is occasionally drunk with coffee. It is also used as input in cultural ceremonies for roasting coffee to make *bunakala* that is served during special occasions and holidays. Ghee is also used to prepare delicious indigenous snack foods such as *chachabsa, chiko, anababiro, silcho* (traditional ghee and table salt mixed with roasted or boiled maize green cobs) and also eaten along with porridge (Yonad, 2009; Alganesh and Fekadu, 2012; Lola and Haile,2015). According to some reports, traditionally madeghee is stored for more than a year and is recommended for patients to treat chronic coughs. (Alganesh and Fekadu, 2012). Ghee is also consumed with coffee and tea especially when important guests are received in a home and during major holiday. Similarly, the use of butter in ghee form to be utilized in different type of sauce, drunk with coffee and for roasting coffee bean in East Wollega Zone Alganesh (2002).

2.3. Butter marketing in Ethiopia

Butter is the most marketable dairy product in the country. Butter marketing system in Ethiopia is still a traditional one, not yet developed. The possible reason for low marketable outlet of dairy products include, among others, producers and consumers are spatially it means producers are found in the rural areas while consumers or profitable market is found in urban areas. Most of the milk supply is distributed from producer to consumer through informal marketing channels in both rural and urban areas. Marketing system in the country is not yet developed. This, in turn, reduces incentives to participate in economic transactions and results in subsistence rather than market-oriented production systems. The butter marketing price is significantly different due to effect of selling time in the overall result as well as in each agro-ecology (low land and mid land). The price is significantly lower in wet season in both low land and overall results while in mid-land, the price is significantly lower in both, wet season and fast period. On the other hand, the highest price was reported in holidays and festivals periods, dry season and no fasting periods in both lowland and overall result; but in mid land area, only in holidays and festivals periods was reported highest price. (Tsegay, 2015).

2.4. Butter Market Channel in Ethiopia

Marketing channel is intended to provide a systematic knowledge of the flow of goods and services from their origin (producer) to their final destination (consumer). This knowledge is acquired by studying the” participants” in the processes, i.e. those who perform physical marketing functions in order to obtain economic benefits. In carrying these functions, marketing agents achieve both personal and social goals. They add value to production and by so doing help satisfy consumer needs. The price pays for the goods, the physical commodities and services (i.e. transportation, bulk breaking, grading) for the services and renders compensated the marketing agents for this effort. This price also serves as a signal to all actors in the marketing channel, i.e. producers, rural assemblers, and transporters, whole sellers and retailers (Mendoza, 1995). Different studies have identified different product flow channels and infer that milk channels are narrower than butter channels due to its relatively high perishable nature. As a result, butter can travel long distance from remote areas to Addis Ababa markets. Hence, the possible outlets for butter from rural can be restaurants, traders, consumers, retailers and wholesalers (Brihanu, *et.al*, 2011).

Butter market channels participants include butter producers, final end users and intermediary traders/and processors. Rural and urban consumers/processors consist of individuals as well as restaurants/hotels. Brokers, who facilitate trading without actually owning the product, are not very common. These brokers usually collect their fees from the traders. Based on the rapid assessment, the following five market channels are identified:

i. Butter producer – rural consumer- Direct sale of butter from producer to rural consumers usually takes place in local rural markets or along the road side and takes place in all the woredas.

ii. Butter producer – assembler/collector – rural consumer. This is another important channel dominated by the assemblers/collectors who buy directly from farmers, or in local markets or along road side and sell to rural consumers.

iii. Butter producer –Assembler/collector – butter shop/retailer– urban consumer for about 2 hours. Since there are a number of rural assemblers in the woreda, they usually compete among themselves to collect butter from produces and rural markets. Prior contractual arrangement is not common; this means butter producers sell their product to any rural assembler offering good prices. In Fogera woreda, some rural collectors collect butter from PAs and supply to shops in Woreta town. They are engaged in this business seasonally, i.e. collect butter during the rainy season, from July to October when feed is abundant.

iv. Butter producers – retailers/processors -This is minor butter market channel. Retailers and/or processors sometimes buy directly from butter producers. In such cases, there is a customer type relationship between the producers and the retailers/processors. For example, in Metema there are no butter markets in the major towns and most butter is traded in rural markets. In Kokit, traders and hotel owners from Gendewuha town buy directly from producers at their residence. In general, farmers with large number of milking cows who often produce large quantities of butter do not take butter to the market, rather traders and hotel owners buy butter directly from the homestead. In some woredas (like Alamata) they refer to this as producer butter, which is usually considered free from adulteration (as compared to trader butter which is often suspected of adulteration).

v. Producers – urban consumer-Another minor butter market channel is one that takes place when producers bring their butter to urban market centres where they sell directly to urban consumers. This market channel is used by producers who live nearby urban centres. (Gebremedhin, *et,al*, 2014).

2.5. Major challenges of butter production and marketing in Ethiopia

According to Debela, (2016), the major constraints of milk production in Ethiopia were feed scarcity, low productivity of animals, labor scarcity for herd management and animal diseases. Butter trade is subjected to both demand and price risks as butter consumption are seasonal due to orthodox Christian fasting seasons. Based on the informal market survey, some traders respond that they shift from butter trading at the time of fasting, as there less demand then lower price during this period. Moreover, spoilage found to be other risk in butter trading due to Perish ability nature of the product.

Following to the risk of seasonal variation in demand and price of butter, traders may be reserved from participating in butter trading to averse the risk of loss. As a result, the risky nature of the business may impose considerable barrier on butter trade (Embaye, 2010).

Similarly, Zegeye (2003) reported that poor genetic potential for productive traits, in combination with the sub-standard feeding, health care and management practices that animals are exposed to are the main contributors to the low productivity. In the same way, Zewdu, (2004) and Belete, (2010) described that factors which hampering milk production in Ethiopia include inadequate feed base, high cost of bought-in feeds, shortage of cash to buy concentrate feeds.

Therefore, the key challenge for the dairy sector development in Ethiopian, feed shortage, dry season, mitigating of the seasonality that affects both supply and demand. The seasonal mismatch between dairy supply (shortage in the months before the rainy season) and demand (drop during fasting months) warrants investment in prolonged shelf life for milk. Seasonal fluctuations in the demand of dairy products follow the various fasting periods during which orthodox Christians abstain from consuming all kinds of animal product foods. This is because of majority of people living in the country region are followers of Orthodox Christian faith and thus do not consume dairy products especially during the Easter fasting period (55 days). Overall, Orthodox Christians are abstained from dairy products for about 200 days per year (Ahmed *et al.*, 2004). Thus, in order to alleviate the marketing problem in the area, it is imperative to educate farmers and demonstrate the importance of milk production and/or processing in order to develop the dairy sector and improve their livelihood. A lot of factors affect the price and demand of dairy products during marketing; some major factors are season and access to market, fasting and non-fasting days, holidays and festivals, supply and demand, purchasing ability of urban dwellers, as well as quality vis-a-vis the origin of the products (Sintayehu *et al.*, 2008)

2.6. Characteristics and quality attributes of butter in Ethiopia

For local butter, the major quality and safety criteria mentioned are freshness (which can be identified by its milky taste), smell, taste (while eating), presence of foreign matter, origin/location it is produced (for example Sheno, a place 80 km from north of Addis Ababa, is considered the source of the best quality local butter and is used as a reference to differentiate quality) and to some extent prices and brands for plant oils. The major problem with local butter quality was adulteration. As a result, consumers tried to check whether there was foreign matter

or not using different mechanisms (such as smelling, tasting and melting). A local butter having foreign matter would not melt easily and its taste and smell would deviate from pure local butter. The quality of local butter also differed by the intended use of it. Fresh local butter were preferred in case of *Kitfo* making while old/mature local butter were relatively preferred for making *Wot*. (Ousman, 2007, cited by Mohammad A *et al*, (2010).

With regards to safety, the major criteria and indicators of safety for raw milk and local butter were form of storage of the product (e.g. storage in refrigerator and cold pot was considered safe compared to open containers exposed to dust and bacteria), neatness or cleanliness of the container for milk/local butter, neatness of the personnel who sold or handled milk/local butter, the extent of exposition to high temperature in the case of local butter (Ousman,2007, cited by Mohammad *et al*, (2010).

2.7. Hygienic quality of butter

The information on butter production and quality is limited in the dynamic condition of production, marketing, processing and consumption (Mekdes, 2008). Although butter has longer shelf-life, it can undergo spoilage by bacteria, yeast and mould if it is not properly handled. The initial microflora of butter should be that of the raw milk or cream from which it is produced if contamination does not occur during production and processing. The microflora of butter should therefore reflect the sanitary conditions of the equipment used in manufacturing, packaging and handling of the product (Ali and Abdelgadir 2011).

The presence of undesirable microorganisms in butter could have a significant impact on its quality and safety through production of off-flavor and physical defects. Historically, butter is considered among low risk products, however, similar to other dairy products, high chance of

bacterial contaminations of the product may occur at any point along the butter value chain and thus its consumption may cause health problems. (Richard 2002).

3. MATERIALS AND METHODS

3.1. Description of study area

This study was conducted in Kinddo Didaye district of Wolaita zone, Southern Nations Nationalities People's Regional State from April 2019 to July 2019 G.C. Kinddo Didaye district is located between latitude 06°46'40"N and longitude 37°21'24"E. This district has a total human population of 34,419 (50.8 % female and 49.2% male). The district is bordered in the northern with Kinddo Koysha, in the south with Qucha district, in the east with Kawo Koysha and in the west Dawro zone. The district is comprised of 14 rural and 2 urban administrative kebeles. Agro-ecologically Kinddo Didaye is divided into lowland (*Garaa*) (30%) and midland (*Bargguwaa*) (70%). Its altitude ranges from 1082 to 2500 masl. The mean annual temperature varies from 18°C to 29°C and it has bimodal rain fall distribution: belg rain from mid January to March, and the kiremt (summer) rain-fall extended from mid June to mid September. The annual rainfall ranges from 1400-1600 mm.

According to 2019, Kindo Didaye district livestock and fisheries office statistics data, the total dairy cattle population of the district is 33,416. Butter production from indigenous zebu cattle breeds is the popular activities for the majority of farmers in the area and butter contributes significant to the household's nutrition security and generate additional income. The main crops in the belg season are maize, sorghum, chick pea, potato and cassava and similarly in summer teff, barley, wheat, bean, haricot bean, pea, potato, cassava, enset, vegetables and fruits (BoARD, 2019; Integrated Development Plan/IDP 2019).

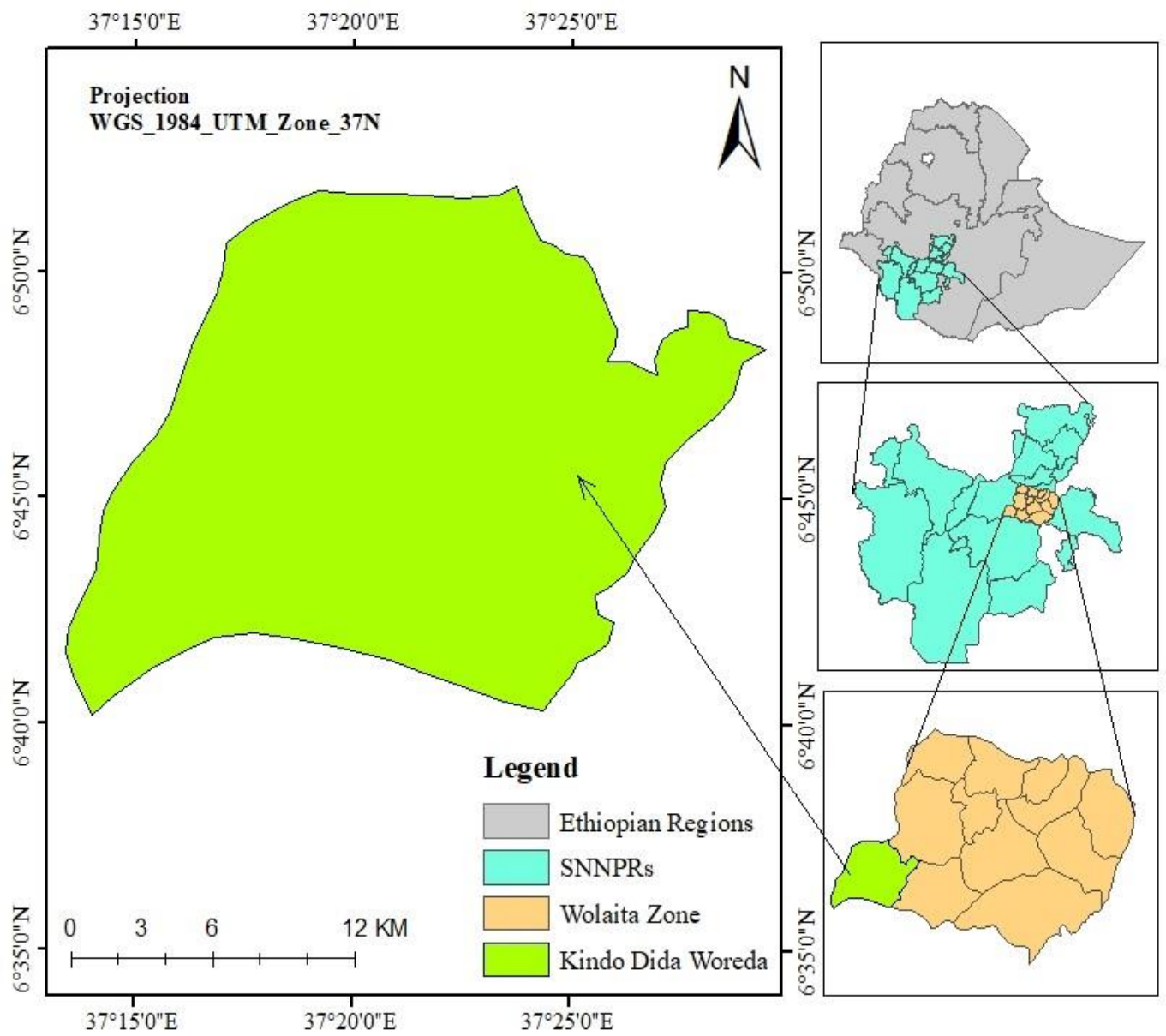


Figure 1 Map of the study area

3.2. Sampling procedure and Sample size

Butter Producers

Multi-stage sampling procedure was carried out to select butter producing farm households. Primarily; the district was stratified into two categories based on agro-ecologies: Midland (70%), and lowland (30%). Next, midland and lowland were selected for the study based on cattle population, dairy production and butter production. Then, totally six administrative kebeles: Bossa-Borto, Bereda, and Zaro from midland and Zebo, Shela-Mekera, and Gocho from lowland were purposively selected based on dairy cow production and butter production. Finally, 29, 18 and 24 households who own milking cows, respectively from midland kebeles and 31, 16 and 20 households respectively from lowland kebeles were proportionally selected based on the population of households in each kebele by using Cochran (1997) sample size determination formula. The formula used for sample size determination was as follows:

$$n = \frac{Z^2 (PQ)}{D^2}$$

Where, n= is the desired sample size

Z= the variance (1.96) with 95% confidence interval

P= proportion of study population from the total and the researcher decided it to 10%,

D= margin of error (5%)

Hence: $P+Q=1$, so $Q=0.9$

By using the above formula, we have

$$n = \frac{(1.96)^2 (0.1 \times 0.9)}{(0.05)^2}$$
$$n = 138$$

Accordingly, $n = \frac{(1.96)^2(0.1 \times 0.9)}{(0.05)^2} = 138.29 \approx 138$ households were selected for survey study.

Butter Retailers

Butter retailers were selected from four markets (Halale, Bossa, Zaro and Gocho) ten (10) retailers were selected from each markets of the district. Total of 40 retailers were selected randomly. Data collected from retailers mainly focus on the source of butter, quality attributes, and price of the butter in district.

Butter shops

Butter shops were selected from Wolaita Soddo town, in which these butter shops are recipient of the butter from the selected study areas. Sampling here is the very difficult task due to the behaviour of the traders. However, to have possible representative there was total of (20) butter shops available in the town, from that, half 50 percent or (10) butter shops were selected purposive sampling methods.

Consumers

Butter consumers were selected from five markets (Halale, Bossa, Zaro, Gocho and Wolaita Soddo town) ten (10) consumers were selected from each markets of the district. A total of 50

sample size used were selected by random sampling. Collected data from consumers was mainly focus on quality attributes, price, consumer preference and adulteration problems.

Table 1. Sampling design

Sample size for survey study			
Number of households selected in each agro-ecology			
	Agro-ecology		
	Lowland	Midland	Grand total
Number of households selected	67	71	138
Sample size for marketing and consumer study			
	Number of selected respondents from different markets	Total selected	Grand total
Retailers	10 from each markets	4*10=40	40
Butter shops	10 from Wolaita Soddo only	10	10
Consumers	10 from each markets	5*10	50

3.3. Methods of Data Collection

The data used for this study was collected both from primary and secondary sources. Primary data on the butter production, marketing system and consumption was collected from the producing farmer up to the end consumer through semi-structured questionnaires. Secondary data was collected from different institutions, organizations and offices as well as through reviewing documents and publications. Descriptions of the methods are presented in the subsequent sub-sections.

3.3.1. Questionnaire survey

Primary data was collected from small holder butter producers, retailers, butter shops and consumers. Four different types of semi-structured questionnaires were prepared and used to

collect primary data from small holder butter producers, retailers, butter shops and consumers by using pre-tested structured questionnaire developed for this study.

Butter production related data

Before beginning collection of data, data collectors/livestock extension agents and the researcher administered the questionnaire with the objectives of the study, different new terminologies used in the questionnaire and type of data they collect. Next, they were asked to select farmers who have dairy cows and produce butter. Then, the selected farmers were briefed about the objective of the study before beginning of the interview. A questionnaire-based survey was used to collect data needed for assessment of dairy cow production, butter production, storing, marketing and challenges of production in study district.

Butter retailers were interviewed to collect the data such as butter source, quality attributes that make butter preferable by consumers, price fluctuation, main buyer, destination of butter and challenges. Butter merchants in shops were interviewed to collect the data such as butter source, butter collection process, consumer preference, price, indicators of quality butter, butter storing and the marketing problems encountered. Lastly, butter consumers were interviewed to collect the data such as butter source, amount they consume, preferable quality to consume, price and challenges on butter consumption, were gathered from respondents based on the questions prepared for each of them.

3.4. Data Analysis

All the collected data were properly managed and entered into SPSS (statistical package for social science) software version 20. The quantitative data were analysed with descriptive statistics (mean and standard error). The qualitative data were analysed by cross tabulation with pearson chi-square and the frequencies and percentages differences across agro ecologies were separated by using the pearson chi-square value at $P \leq 0.05$.

For all parameters in butter production, independent samples t-test at $P \leq 0.05$ was used to compare the means difference across agro ecologies by using the following model.

Model: the appropriate model used for this study was as follows:

$$Y_{ij} = \mu + \alpha_i + \varepsilon_{ij}$$

Where;

Y_{ij} = measurement or observation due to i^{th} factor

μ = the overall mean

α_i = the effect of factor i (agro ecology)

ε_{ij} = random error with mean zero (0) and variance σ^2

Descriptive statistics like percentage, mean, standard error, maximum, minimum and frequency distribution were also used to describe the butter marketing, consumption, quality and production problem in the study area.

4. RESULTS AND DISCUSSIONS

4.1 Demographic characteristics of butter producers in the study area

The results on family size, educational background, sex and age group of butter producing farm households are shown as Table 2. The average family size per household was 5.84 ± 0.19 and 5.97 ± 0.16 persons per family in lowland and midland agro-ecology, respectively with the overall mean of 5.9 ± 0.23 . The average family size of current study is comparable with the finding of Teshome and Tesfaye (2017) in Bench Maji zone reported 5.93 ± 0.15 , Addisu *et al.* (2016) in Gonder town reported 5.7, Bekele *et al.* (2015) in Dangila reported 5.87 and Tesfaye (2007) in Matema district reported 5.7, Debela (2016) in Dire Inchini and Ambo reported 5.87 and 5.58 persons per family. In contrast, greater family size than current finding was reported by Tollossa *et al.* (2014) in Borana area (7.76), Adebabay (2009) in Bure district (6.22), and Asrat *et al.* (2013) in Boditti Qorke (7.2), in Boditti Hagaza (7.3), in Fate (6.2) and 8.1 at Hagaza Doge with overall mean of 7.2 persons per family in Wolaita area.

The educational background of respondents revealed that about 15.9% were illiterate and the rest 26.1%, 39.9%, 16% and 2.2% attended Grade 1-4, 5-8, 9-12 and >12, respectively. Education plays an important role in adoption of new technologies and believed to improve readiness of farmers to accept new ideas and innovations in areas of dairy production, processing and marketing. It also enables farmers to get updated demand and supply information. Therefore, formal education of household head helps butter production activities. Percent illiteracy in the current study area is similar with 22.5% illiteracy as indicated in the report of Getu *et al.* (2016) in Gonder and Gojam of Amhara region, Ethiopia. However, it is lower than 27.78% illiteracy reported in Bench-Maji Zone of Southwest Ethiopia (Weldegebriel, 2015). Percent illiteracy in the current study area is more than 10% illiteracy which indicated in the report in Aleta Chukko

district of Southern Ethiopia by Beriso *et al.* (2015). The variation in educational level of butter producer farmers in different locations might be due to the difference in access of education and the awareness of individual to attend school. The current finding indicates majority of butter producer farmers were not well educated in both agro-ecologies, and this can limit an awareness, knowledge and skill of farmers in dairy cows' management, hygienic milking practices, proper milk handling and processing, products quality control and other related activities. The Pearson chi-square test indicated that overall in the study area, the level of education in both agro-ecologies was not significantly varied ($P>0.05$).

The sex of respondents indicated majority (88.4%) were male headed and the rest (11.6%) were female headed. This shows the ownership of dairy cattle in the study area is dominated by males. The dominance of male headed dairy production of the current study is agreed with the report of (Belay and Jansens 2014) who stated about 75.9% of dairy producer farmers in Jimma area were male headed. Similarly, Addisu *et al.* (2016) reported 86.7% and 13.3% of respondents in Gonder town were male headed and female headed respectively. This indicates the responsibility for livestock production and share of household activities in different area is different. This might be due to the variation of culture and way of living, which influence the property ownership and labor allocation within households in different locations. In both agro-ecologies of current study area males dominate household head position ($p<0.05$) than females and this might be due to the perception given by the community that males are stronger than females to lead the family and the influence of culture, which forces females to take more of kitchen and other home activities. However, respondents revealed majority of feeding, milking, milk handling and processing, milk products marketing and other routine activities were carried out by females.

The overall age categories of family members in current study indicate that the majority (76.8%) fall under the age group of between 15-30 years old and the remaining balance 13.0%, and 10.1% were belong to age group of between 0-14 and 31-64 years old, respectively. This finding is agreed with the report of Asrat *et al.* (2013) who indicated majority of household members (57.7%) were within productive age group categories in mixed crop/livestock production systems in and around Boddit area, Wolaita zone. In general, more than half of family members (76.8%) in both agro-ecologies were within productive age group and this indicates there would be a potential human power, which is believed to improve the dairy development sector in the study area.

The respondents believe that age and sex of the household head, their educational level and family size have consequences on the livestock husbandry practices. This might be due to family members with more of productive ages, male headed and better educated can improve dairy cows' management, products handling and processing. Similarly, Asrat *et al.*,(2013) stated male household head has more power and capacity in collecting and accumulating feeds, performing outside cattle management activities than females and educated households improve at least some of the livestock related routine managements. Regarding to family size, the respondents consider large family size contribute a lot to cattle related activities in collecting feeds and handling animals outside.

Table 2. Demographic characteristics of butter producers in study area.

		Agro ecology			
		Lowland	Midland	Overall	
		N=67	N=71	N=138	
Parameters		Mean±SEM	Mean±SEM	Mean±SEM	<i>p-value</i>
Family size	Male	2.82±0.08	2.83±0.08	2.82±0.16	0.935
	Female	3.02±0.11	3.14±0.08	3.08±0.07	0.436
	Total	5.84±0.19	5.97±0.16	5.9±0.23	
Parameters		%	%	%	X^2
Educational level	Illiterate	14.9	16.9	15.9	
	Grade(1-4)	19.4	32.4	26.1	
	Grade (5-8)	52.2	28.2	39.9	
	Grade (9-12)	10.5	21.1	16.0	0.070
	Higher (>12)	3	1.4	2.2	
	Total	100	100	100	
Sex of HHs head	Male	95.5	81.7	88.4	
	Female	4.5	18.3	11.6	0.011
	Total	100	100	100	
Family members	0-14	11.9	14.1	13.0	
	15-30	77.6	76.6	76.8	
	31-64	10.4	9.9	10.1	0.930
	>65	0	0	0	
	Total	100	100	100	

N=total sample size, HHs=households, SEM=standard error of mean, X^2 =Pearson chi-square

4.2. Source of household income in the study area

The sources of household income in the study area are shown as Table 3. In the study area, livestock keeping, crop production, mixed crop-livestock production and off-farm activities are the means to generate the households' income. The dominant farming system, crop-livestock mixed agriculture was the primary source of household income source (87.75%) in current study district. The rest few respondents, (5.05%, 4.3% and 2.9%) reported to get income from only livestock production, crop production and trade, respectively. Farming systems in both agro-ecologies is not significant ($p>0.05$). Similarly, 91.1% of respondents in central Zone of Tigray, northern Ethiopia practiced mixed type of production, 6.7% livestock production and 2.2% crop production (Destalem *et al.*, 2015). Majority of the respondents reported they consume milk from own farm and cattle were the animal species kept for milk.

Table 3. Source of house hold income in study area

	Agro-ecology			P-Value
	Lowland(N=67)	Midland(N=71)	Total (N=138)	
Major income source household	(%)	(%)	(%)	p-value
Crop production	3%	5.6%	4.3%	0.873
Livestock production	4.5%	5.6%	5.05%	
Both crop and livestock production	89.6%	85.9%	87.75%	
Trade	3.0%	2.8%	2.9%	
Source of milk consumed in HH (%)				
Home produced	100	100	100	-
Animal species for milk source (%)				
Cow	100	100	100	-

4.3. Livestock holding and herd structure per household

In the study district, farmers keep different livestock species for different purposes. Among them cattle were the dominant one which followed by poultry depending on their purpose and economic values. Other livestock species such as goat, sheep and donkey were also kept in the area. The purpose of keeping cattle in current study area is in line with the report of Asaminew and Eyassu (2009) who revealed cattle were kept for multi-purposes such as draught power, milk, meat and income to farmers in Bahir Dar Zuria and Mecha woredas of north-western Ethiopia. In the current study area, different livestock species listed above were raised together.

According to farmers in the study area, donkey were more preferable by lowland agro-ecology and is raised only for transportation of grass, food and other household goods, which are so important for raising other livestock species, including cattle. But farmers of midland reported that donkeys and mules were important animals used for transportation of different materials.

Majority of respondents (92%) were reported to use local indigenous zebu cow breeds for milk and the rest few (8%) reported to keep cross breeds together with local breeds. Very few number of cross breed calves and heifers are available, but there is no milking cross breed cows in study area, specially selected kebeles. This implies that milk and milk product in the study area mainly come from indigenous cow breeds and they act as source of income for the community. The local animal breeds were more preferred over crossbred animals that they can be purchased by few capital, require small amount of feed, easy for management, and resist disease especially during dry seasons.

Table 4. Livestock holding and herd structure in the study area

		Agro-ecology		Overall mean	±SE	P-Value
		Lowland	Midland			
		Mean TLU±SE	Mean TLU±SE			
Local calves	M	0.20±0.01	0.19±0.01	0.19±0.09		0.653
	F	0.16±0.01	0.20±0.01	0.18±0.09		0.019
Crossbred calves	M	0.02±0.01	0.02±0.01	0.02±0.007		0.933
	F	0.006±0.005	0.11±0.007	0.008±0.004		0.597
Heifer	Local	0.21±0.03	0.19±0.03	0.20±0.02		0.703
	Cross	0.01±0.01	0.01±0.01	0.01±0.008		0.597
Oxen	Local	0.27±0.06	0.23±0.05	0.25±0.04		0.587
	Cross	0.02±0.02	0.05±0.03	0.04±0.02		0.597
Pregnant cows	Local	0.47±0.05	0.39±0.05	0.43±0.04		0.315
	Cross	0.00±0.00	0.07±0.04	0.03±0.02		0.090
Lactating cows	Local	1.50±0.04	1.65±0.05	1.58±0.03		0.031
	Cross	0.00±0.00	0.00±0.00	0.00±0.00		
Sheep		0.09±0.01	0.08±0.01	0.092±0.01		0.539
Goat		0.12±0.01	0.07±0.01	0.10±0.009		0.008
Horse		0.00±.00	0.05±0.02	0.02±0.01		0.027
Mule		0.022±0.01	0.056±0.01	0.039±0.01		0.143
Donkey		0.059±0.019	0.01±0.009	0.036±0.011		0.039
Chicken		0.049±0.005	0.057±0.005	0.053±0.003		0.315

Breeds of cow (%)	(%)	(%)	(%)	p-value
Local breed	92.5%	91.5%	92%	0.830
Cross breed	7.5%	8.5%	8%	
Total	100	100	100	

M= Male, F= Female, TLU= Tropical livestock unit, SE= Standard error, Pregnant and lactating= during data collection period

4.4. Milk handling, storage and clean milking utensil

Milk handling, storage and milk utensil cleaning practices in the study area are shown as Table 5. After milking, it is highly recommended that proper milk handling and storage method is essential to maintain the quality of milk and milk products. In current study district, all of the producers (100%) were reported to store milk for processing. Overall in the study area, all of the producers (100%) used traditional milk cooling system (i.e. either they put raw milk in cold water bath or in cold place before churning, especially during dry season). The current report is similar with the finding reported by Saba (2015) who indicated that all producers used traditional milk cooling method (put raw milk in cold water bath) in Adea Berga and Ejerie Districts of West Shoa Zone.

The major purpose of storing milk was for processing (94%) and the remaining (6%) were for sale of fresh milk and yoghurt in the study area. The report consistent with the reports of Beyene (1994) in the southern region, Yilma *et al*, (2011) in the central highlands of Ethiopia, Tola (2002) in eastern Wollega and Fita (2004) in the east Shoa zone of the Oromia region, where most of the farmers do not sell fresh milk but sell butter. On the other hands this result was not agreed with the finding of Belachew *et al*, (1994) which stated that the producers sell milk to consumers. Majority of producers reported that storing materials for milk were clay pot and in

some cause they use gourd, plastic containers. Milk is sterile at secretion in the udder but is contaminated by bacteria even before it leaves the udder. Further infection of the milk by microorganisms can take place during milking, handling, storage, and other pre-processing activities. Therefore, in the study area the farmers practice different methods to prolong the shelf-life of milk and products. Majority of respondents (75.4%) wash milk utensils with Luke water and smoke it before its being used. The remaining households (24.6%) clean by only washing with Luke water to clean milking utensil. This practice is common in most parts of the country (Zegeye and Belay (2017)). To increase the shelf-life of milk and its products, farmers smoke utensils by placing clay pot on fire and place smoking plants and water in the pot, after that they boil all together. At the end they put-off from fire and rub the pot by fingers and plants very well to remove dirties and milk and milk products residue on the utensils. The frequency of cleaning utensil in study area indicate that (50.7%) were only when using the utensil, the remaining reported that (23.9%) and (21%) were twice a day and clean daily respectively. However, the frequency of cleaning milk utensils was significantly differed across agro-ecology ($P < 0.05$). Frequency of washing, daily and twice a day were more in lowland than midland because of microorganism's development fast by lowland temperature or environment. Lastly time of cleaning in study area (78.1%) were reported that, they clean before and after use of the milking utensil and the remaining (21.9%) respondents, clean at any time when necessary to clean the utensil.

The plants and spices most commonly used for cleaning milk utensils were identified as Kosorote (*Ocimumhaardiense*) (68.1%), Tejsar (*Cymbopogan martini*) (23.9%) and other unidentified species(8%) such as locally (*mudha, gulluwa, hokkuwaa, zittuwa and xaytta*) to make good odor, smell, more attractive milk and milk by products to markets and consumer. In

the same way, Gemechu and Amene (2017) reported that smoking of milking and milk storage containers was done by using Kosorote (*Ocimumhaardiense*), Tejsar (*Cymbopogan martini*), Tenadem (*Rutachalepensis*) and wood splinters of ‘Weyira’ (*Olea africana*) in the areas. In addition to imparting pleasant flavour, it facilitates fermentation and increases shelf-life of milk and milk products. Smoking has antimicrobial activity, thus inhibits the growth of microorganisms in milk (Mogessie and Fekadu, 1993 and Teshomeet *al.*, 2014 cited in Gemechu and Amene, 2017).

According to the local understanding, the practice of smoking the milk vessel by burning wooden chips of specific trees and shrubs has an advantage of imparting special taste and odour to the product, and to disinfect the vessels, thus reducing the numbers of micro-organisms and thereby extending the shelf life of the product. The report of Ashenafi (1996) supported this assumption, as greater numbers and a faster development of aerobic mesophilic microorganisms occurred in milk kept in non-smoked as compared to smoked containers.

Table 5. Milk handling, storage and cleaning utensil in the study area

Variable	Agro-ecology			P-Value
	Lowland(N=67)	Midland(N=71)	Total(N=138)	
Do you store milk?	(%)	(%)	(%)	
Yes	100%	100%	100%	-
Means for storage				
Traditional cooling system	100%	100%	100	-
Purpose of storing milk (%)				
Sale	6 %	1.4%	3.6	0.152
Process into other products	94%	98.6%	96.4	
Milk storage material				
Clay pot/Ensira	100%	100%	100	-
Clean milk storing container				
Yes	(%)	(%)	(%)	
Yes	100%	100%	100	-
Methods of cleaning				
Wash Luke water only	20.9%	28.2%	24.6	0.322
Wash Luke water and smoking	79.1%	71.8%	75.4	
Frequency of cleaning				
Daily	(%)	(%)	(%)	
Daily	28.4%	14.1%	21%	0.022
Twice a day	25.4%	22.5%	23.9%	
Only when using	46.3%	54.9%	50.7%	
Others	0	8.5%	4.3%	
Time of cleaning				
When necessary	25.4%	18.3%	21.9%	0.315
Both before and after use	74.6%	81.7%	78.1%	
Plants used for cleaning milk storage containers (%)				
Kosorote (<i>ocimumhaardiense</i>)	67.2%	69%	68.1%	0.916
Tejsar (<i>Cymbopogan martini</i>)	23.9%	23.9%	23.9%	
Others	9.0%	7.0%	8%	

N=Number

4.5. Butter preference and income source in study district.

Butter preference in the study area shown as Table 6. Butter producers in study area use different materials to store butter and churn milk; Majority of butter producers reported that butter is the main income source among dairy products. The clay pot/Ensira/churner/ is butter making materials in the study areas. Majority producers (97.8%) produce butter on daily basis while few famers (2.2%) reported to wait for two days until milk is collected and churned.

Butter producers reported sale of butter plays a significant role for rural farmers in generating households' income. Butter is main source income from dairy and preferable product, this finding agree with Embaye, (2010) who reported butter is common marketable dairy product in Atsbi-Wonberta and Alamata. Similarly, Lina *et,al* (2016) who reported first importance of keeping animals in the Menz district was production of butter and milk. This is in agreement with the reports of Tola (2002) in eastern Wollega and Fita (2004) in the east Shoa zone of the Oromia region, where most of the farmers do not sell fresh milk but sell butter.

The clay pot churner is butter making material in study area. The current finding is agreed with the finding of Debela(2016) who reported clay pot can also be used for churning fermented milk, as it is suitable for rocking on the floor, and also it is used for storage of butter for longer shelf life of the butter Dire Inchini and Ambo. It also agreed with the finding of Mekdes (2008) who reported the commonly use of small, medium and large sized clay pot for butter storage, fermented milk storage and churning purpose, respectively in Wolayita Zone. The current finding disagreed with the finding of Eyassu and Asaminew (2014) who reported that gourd is most commonly used for milking, fermented milk storage, churning and butter storage in North Western Ethiopia.

Table 6. Butter preference and income source in study area

Variable	Agro-ecology			P- Value
	Lowland(N=67)	Midland(N=71)	Total(N=138)	
Prefer to use butter	(%)	(%)	(%)	
Yes	100	100	100	-
Containers used for butter making				
Clay pot churn	100	100	100	-
Main income source from dairy				
Butter	100	100	100	-
Do you make butter?				
Yes	100	100	100	-
Butter making how long you collect milk				
Daily milk	97	98.6	97.8	0.526
Two days	3	1.4	2.2	

N= number, Kg=kilo gram

4.6. Butter making practices

Butter making practice in the current study area indicated in Table 7. Factors such as, volume of milk churned at a time, length of churning time, butter yield from a given milk and volume of milk produce 1kg butter, statistically there was a significant difference ($p < 0.05$) between agro-ecologies on the parameters which involved in butter making. The length of churning time, quantity of butter produced were significantly higher ($p < 0.05$) in midland agro-ecology than in lowland; whereas volume of milk required to produce 1 kg of butter were significantly higher ($p < 0.05$) in low land than in midland agro-ecology. Significantly longer churning time recorded in midland agro-ecology might be due to relatively cooler temperature which increases the churning time and also the type and size of churning material which were varied in individual household can affect the churning time. The churning time recorded for butter making in this

study was comparable with the finding of Zelalem *et al*, (2007) in Holeta and Selale was 222 minutes; but much higher than the result reported by Debela (2016) in Dire Inchini and in Ambo were 163.8 and 150 minutes, respectively. The higher ambient temperature of lowland area shortens the churning time. The overall volume of milk required to produce 1 kg of butter (16.52 ± 0.14 liters) in current study was lower than the report of Eyasu and Asaminew (2014) from North Western Ethiopia (18.1liters); and also the result reported by Debela (2016) in West Shewa zone (20.74 liters) and Zelalem *et al*. (2007) in Holeta and Selale (21 liters). This variation might be associated with either the variation in chemical composition of milk, breed of animal etc.

Table 7. Butter making practice in study area

Parameters	Agro-ecology			p-value
	Lowland	Midland	Overall	
	N=67	N=71	N=138	
	Mean±SEM	Mean±SEM	Mean±SEM	
Vol. of milk churned at a time(L)	3.0±0.12	2.91±0.01	2.95±0.01	0.000
Churning time(minutes)	180.3±0.49	198±0.71	188.5±0.87	0.000
Butter produced (g)	171.1±1.03	214.20±0.92	192.6±1.99	0.000
V. milk produce 1 kg of butter (L)	17.92±0.13	15.04±0.09	16.52±0.14	0.000

N= number, SEM= standard error of mean, L= liter V=Volume g=gram

4.7. Purpose of butter production in study district

Information about sell and quality of butter is presented in table 8. Households produce butter for different purposes. In current study area, majority of respondents (64.5%) reported to produce butter for sell and home consumption and the remaining (35.5%) produce only for selling and also in some cases they offer to relatives and neighbours as a gift. Fresh milk is used for household consumption, and processing into butter and sold in near or far away markets. This result is agreed with the report of Lina *et.al*, (2016) who reported that producers convert surplus milk to butter or ergo (fermented milk) and consume in the household or sell to their neighbours. Some butter or local cheese will be supplied to urban areas. Nearly all (98%) sell milk products like butter in Menz district. Majority of producers feel about the quality of the butter they provide to the market and consumer. Lastly the market and consumer prefers quality butter from producer, so provide nice smell, clean and good texture butter to consumers.

Table 8. Purpose of butter production in study district

Purpose of butter production	Agro-ecology			P-Value
	Lowland(N=67)	Mid highland (N=71)	Total(N=138)	
Sell	40.3%	31%	35.5%	0.253
Sell and home consumption	59.7%	69%	64.5%	
Do you feel about quality				
Yes	100	100	100	
Total	100	100	100	
Market prefers your butter				
Yes	100	100	100	
Total	100	100	100	

N=Number

4.8. Preferable Quality Attributes of Butter

In current study district, preferable quality attributes of butter are shown in Table 9. According to butter producing respondents, butter quality attributes preferable by consumers were (44.9%) color, (26.1%) texture, (23.2%) flavor and (5.8%) fermentation. The butter quality attributes preferable by consumers were not significant different among the agro-ecologies ($P>0.05$). From place to place there are different thing that make butter unique, according to current study area, the things that make butter unique or preferable by consumers (55.8%) of respondents were reported feeds that dairy animal feeds on, (22.5%) reported animal husbandry practices (13.0%) reported breeds of dairy cattle in the study area (6.5%) reported agro-ecology of study area is suitable to dairy cattle and the remaining (2.2%) reported others.

4.9. Perceptions of farmers on the possible factors that influence acceptability of butter

1. Feed Type-Peculiar grasses that grow naturally in the grasslands such as *Woshuwa*, *Lamuxa*, *otta maata*, were reported to enhance the quality and quantity of milk and butter. Distinct variety of leaves of both small and large trees such as leaves of *ltruwanjiya*, *Gara*, *Danddretta*, *Haytta Tukkiya*/Coffee leaf/ also improve butter quality. These leaves are given to dairy cows both directly or grinded and mixed with hot water then cook with maize cow pea; and feed milking cows. Crop residues such as different straw, cotton seed and hay were given. Elder mothers collect leguminous grasses and plants like locally (*Maattaa/Oyssa Maata*) and give them to milking cows.

2. Special treatment provided to milking cows-Usually milking cows are treated specially in isolation from others in feeding them domestically; zero grazing and fenced grazing is sometimes done. The main reason is to prevent them from intense sun, provide them with adequate water and other treatments. But they live together with others and with their calves.

During milking they bring their calves to dam. This is a psychological treatment to easily stimulate their breast to increase the amount of milk. Women especially mothers pass the night with the milking cows, if the home is different.

3. **Butter side:** - the quality of butter includes, less leftovers after purification, yellowish color, a nice taste and a pleasant smell, stiffer when pressed with finger. Higher attentions were given towards sanitation and quality of butter. The clay pot is thoroughly washed and condensed with peculiar flora. Haile georgis, (2012) reported similar management provided to dairy cows around Kucha district. At national level most of the feed is coming from green fodder (grazing) while in the study area. In the study area, Majority of respondents reported feeds of dairy cattle were (93.5%) feeds both grass and concentrate, which means homemade cereals like maize, millet, wheat flour, by-products, bran, (4.2%) feeds Grass and local spices to improve butter production (tree spices locally *iterwanjiya*, *gulluwa*, *oyssa maataa*,) and coffee leaves etc. They chop them then cook then after feed dairy animal, Cereals and legumes they cook maize with cow pea, soya bean then feed milking animal to improve butter quality, yield and color. Lastly (2.2%) feeds only grass good for butter production.

In the study area, various types of feed resources are prepared and fed to the animals depending on the season. Crop residues were major feed resource in dry seasons especially from December to March. The common crop residues used as feed resource include maize stover and teff straw which are collected during crop harvesting season and stored for further use during the dry season. This is in agreement with Destalem *et al*, (2015) who reported that crop residue was the most common feed resource of dairy cattle in Central Zone of Tigray, Northern Ethiopia.

Other feeds used during long dry seasons for cattle feeding in the current study area include cassava leaf, shiferaw leaf, wanza leaf, enset leaf and root; and sweet potato leaf. According to

Ketema (2014), Potatoes and ensets are also commonly used feeds in Kersa Malima woreda. Similarly, Asrat *et al.*,(2016), have indicated in their report that grazing, natural grass, hay, purchased green grass and cereal crop residues as well as pseudo stems of enset (false banana) and their leaves are feed resources for dairy cows in and around Wolaita Soddo, Southern Ethiopia. Hay, crop residue, enset, roots and tuber (cassava, sweet potato) and *nufuro* are part of feeds in the study area.

Table 9. Preferable quality attributes that make butter unique in study area

	Agro-ecology			P-Value
	Lowland(N=67)	Mid highland(N=71)	Total(N=138)	
quality attributes				
Color	43.3%	46.5%	44.9%	0.986
Flavor	23.9%	22.5%	23.2%	
Fermentation	6.0%	5.6%	5.8%	
Texture	26.9%	25.4%	26.1%	
What makes your butter unique				
Feeds that dairy animal feeds on	58.2%	53.5%	55.8%	0.963
Breeds of dairy cattle	11.9%	14.1%	13.0%	
Agro-ecology	6.0%	7.0%	6.5%	
Animal husbandry	22.4%	22.5%	22.5%	
Others	1.5%	2.8%	2.2%	
What are the feeds of your dairy cattle				
Only grass	3.0%	1.4%	2.2%	0.814
Grass and concentrate	92.5%	94.4%	93.5%	
Grass and local spices to improve				

Butter production	4.5%	4.2%	4.3%
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N= number

4.10. Challenges of Butter production

Butter production challenges directly related to dairy production challenges because of the good dairy production in the area also there is good butter production. Different challenges of butter/dairy production in the study area, 65.2% report shows lack of quality feeds both (roughage and concentrate), 31.2% grazing area shortage, 2.2% availability of disease case, and 1.4% others like, breeds, high price of concentrate feeds which is not affordable by farmer level. In opposite to the current finding, some authors in different parts of Ethiopia (Yayeh *et al.*, 2014; Ketema, 2014; Getu *et al.*, 2016) reported disease the first constraint. However, in the same way with the current result, other authors (Mebrahtom and Hailemichael, 2016; Belete *et al.*, 2010; Fisahaye, 2016 and Seid, 2012) reported feed shortage first dairy production constraint among others.

Feed availability in the current study area varies depending on season. The study households indicated that feed is surplus during wet season. However, feed conservation practices not yet practiced and simply feed dried crop residue and hay. This is due to that most farmers do not know how to conserve feed.

In the other way, disease is not a major dairy cattle production constraint in the current study area. Vaccines given to the animals regularly were controlling most infectious diseases in the study districts. In both agro-ecologies butter production challenges were not significant ($P>0.05$). The butter producers reported that other challenges were face when they sell butter during marketing were price fluctuation, fasting date and kilo gram problem (retailer adjust or tie

gram). According to producers report 100% did not process butter further into other products before selling.

Table 10. Challenges Butter production in study area

	Agro-ecology			P-Value
	Lowland(N=67)	Mid highland(N=71)	Total(N=138)	
Challenges of butter production				
Lack of quality feeds	64.2%	66.2%	65.2%	0.490
Grazing area shortage	32.8%	29.6%	31.2%	
Disease	3.0%	1.4%	2.2%	
Other	0%	2.8%	1.4%	
Process butter further into other products				
No	100.0%	100.0%	100.0%	-

N=number

4.11. Butter storing, packing and processing in study district

In both agro ecologies of study area, all of the respondents (100%) reported that there was no modern butter making and storing equipment and this indicated that butter making practices and materials used were all traditional, time consuming and had lower processing efficiency. The result obtained in this study was similar with the report of Belay and Janssens (2014) who indicated that traditional milk processing materials and methods used are time consuming, laborious and inefficient in terms of fat recovery and smallholder producers lack the required technological, organizational as well as institutional capacities.

In study area, clay pot (*locally manaaciya*) is the major butter churning tool used by all respondents (100%) in both agro ecologies of study area. However, the size of material was differed depending on the quantity of milk churned at a time. The result agreed with reported by

(Abebe *et al.*, (2013) indicated that to make butter, clay pot or bottle gourd used as a churner. The result was also similar and slight difference on using plastic container with the study conducted by Belay and Janssens (2014) who revealed that sour milk processed into butter using traditional materials such as plastic container, bottle gourd, and clay pot.

The finding was also supported with Comparable result to current finding was also reported by Ahmed (2003) that mostly (96.5%) of dairy producers used traditional churning material, which is made from clay pot and gourd. Similar information also reported by (Addisu and Shewangizaw (2014)) in which clay pot was major milk fermentation equipment followed by plastic bucket in Wolaita Soddo district. The common practice of butter making in study area was that the whole naturally fermented milk was half-filled with churn and the churn was placed on cloth and shacked forward and backward on the floor until fat granules were formed and finally the butter was separated from butter milk. Similar to current practice of butter making is reported by Eyassu and Asaminew (2014) who indicated that when using clay pot, the churn is placed on a mat on the floor and rocked back and forth until butter grains are formed.

All respondents storing butter before sell, 65.9% were store one week, 26.8% were store two weeks, the remaining store three weeks and one month.

Majority of respondents store butter, about (68.8%) were by dried thin stem of inset (locally *Gobba*), 26.1% were by Clay pot and 5.1% were gourd. In both agro-ecologies butter store is similar but it is statistically significant ($p < 0.05$). A leaf of plant called *koba/inset* (false banana) is the most common material used for butter packaging in southern parts of Ethiopia. *Koba/inset* is believed to be important to keep butter fresh until marketed. However, some respondents indicated that the leaves may reduce the weight of the butter because when the cover is removed

some butter remains stacked on the leaves (Mekdes, 2008).The same author recommended the need of further study on the effect of packaging butter with leaves on the quality and sensory characteristics. In other parts of Ethiopia, use of clay pot for storage or packaging of various dairy products including butter and ghee is common (O'Mahony and Ephirem, 1985; Zelalemand Inger, 2001b; Eyassu and Asaminew, 2014)

They all clean containers used for butter and making/storage, majority clean by washing and smoking. Tap/pipe water used by all respondents to clean butter making and storage container in the study area.

Table 11. Butter storing, packing and processing in study district

	Agro-ecology			P-Value
	Lowland(N=67)	Mid highland(N=71)	Total(N=138)	
Store butter before sell				
Yes	100.0%	100.0%	100.0%	-
How long do you store				
One week	68.7%	63.4%	65.9%	0.524
Two weeks	23.9%	29.6%	26.8%	
Three weeks	3.0%	5.6%	4.3%	
One month	4.5%	1.4%	2.9%	
Containers used for butter storage				
Clay pot	23.9%	28.2%	26.1%	0.020
Gourd	10.4%	0%	5.1%	
Dried thin stem of Inset (gobba)	65.7%	71.8%	68.8%	
Clean containers you use for butter and making/storage				
Yes	100.0%	100.0%	100.0%	
How you clean				
Washing	94.0%	98.6%	96.4%	0.152
Smoking	6.0%	1.4%	3.6%	
Water source for cleaning				
Tap/pipe water	100.0%	100.0%	100.0%	

N=number

4.12. Butter marketing by Retailers

As indicated in Table 12, all retailers were from Kinddo Didaye markets, majority of the respondents were females in the study area. This implies that butter marketing in the area is mainly conducted by females in the study area and majority of them were in the age range of 26-35 years.

Almost all the retailers collect butter in small amounts and sell it to different customers in small amounts and sell to butter shops or consumers. The majority of retailers level of education were Elementary School (35%), Basic Education (25%) and high school (25%). The level of education helps them easily communicate with language speakers of on the different markets.

4.13. Source and quality attributes of butter

In the study area retailer butter trade experience, quality attributes and source of butter are shown as Table 12. According to the report 60%, 20% and 20% retailers were (1-5), (6-10) and (>10) years of Experience in butter trading respectively.

Retailers in the study district reported that the main source butter and they get quality butter from producers. The quality attributes of butter preferable by consumers in study district 45% were reported that Color, the remaining (27.5%, 20%, and 7.5%) were texture, flavor and fermentation respectively. The quality attributes which receives more prices in the study district ,(30%, 27.5%, 27.5% and 15%) were by fermentation, color, texture and flavour respectively.

This result of finding is agree with the Asaminew,(2007) who reported, consumers /traders consider the colour, flavour, texture and cleanness of the products during transaction, that butter quality requirements fetch a good price. During the dry seasons butter price increase, this is

related to abridged milk yield of cows due to the insufficient feed supply. Higher price was also paid for yellow coloured and hard textured butter that deemed to be higher in dry matter in Bahir Dar area.

Table 12. Source and quality attributes of butter by retailers

Variable	Frequency	Percent (%)
Experience in butter trading		
1-5 years	24	60%
6-10 years	8	20%
>10 years	8	20%
Source of your butter		
From producer	40	100%
Sources you get quality butter		
Producer	40	100%
Quality attributes your		(%)
Butter preferable by consumers		
Color	18	45%
Flavor	8	20%
Fermentation	3	7.5%
Texture	11	27.5%
Which quality attributes receives more price		(%)
By fermentation	12	30%
By color	11	27.5%
By flavor	6	15%
By texture	11	27.5%

4.14. Buyer and destination of butter

About 85% of retailers sell butter to butter shops, 10% to hotels and restaurants and the remaining to home consumers. According to respondents there is no cooperative involved in butter marketing in the study area. Destinations of the butter reported by respondents (92.5%) were to Wolaita Soddo town and (7.5%), Hawassa, Addis Abeba and other areas of the country.

Table 13. Main buyer and destination of butter the district.

Variable	Frequency	Percent (%)
Main buyer of your butter		
Hotels	4	10%
Home consumers	2	5%
Butter shops	34	85%
Destination of your butter		
Wolaita Soddo	37	92.5%
Others	3	7.5%

4.15. Butter shop information

4.15.1 Butter traders/shops

The butter shop respondents business experience, educational back ground and age groups are shown as Appendix table 1. Majority of sampled butter shops 80% were (>10 years) and 20% were (6-10 years) of business experience, respectively. With regard to gender, 100% of respondents of butter shops were male. The age group 80% were (36-45) and remaining 20% were (26-35). The majority (80% of respondents) of butter traders/assemblers had high school

level of education; whereas the 10% of traders were Elementary School and remaining 10% of traders were Higher Education. According to the survey result, education level of traders helps them to communicate with vast and various number of consumers having different languages and attitude.

4.16. Butter collection and shopping

According to butter shop respondents report butter collection and shopping were indicated in Table 14. The report shows that average days they collect butter for sale (60%) were one week and 40% were 4 days. With regard to source of butter, 90% were from retailer and 10% were from producer. Sampled butter shops gets quality butter by increasing price/better offer/ and they had constant clients supply up to their butter shop. According to respondents, the amount of butter collected per week, depending on supply and season it varies from this (70%) of respondents have not willing tell exact amount and (30%) reported that (100-200 Kg) of butter they collect per week in study area. Almost all of respondents reported that selling place of butter were butter shop. The study agree with the report of Lina *et.al*, (2016) the amount the traders collect in Mehal Meda traders buy an average 34.5kg of butter in one market day while the one in Molale buys an average 20.5 kg of butter from farmers in one market day in the district.

Table 14. Butter collection and shopping in the study area

Variable	Frequency	Percent (%)
Do you collect butter for sale		
Yes	10	100%
How many days you collect for sale		
4 days	4	40%
One week	6	60%
Source of butter		
Producer	1	10%
Retailer	9	90%
Consumer prefers or of your butter		
Yes	10	100%
How you get quality butter		
By increasing price	7	70%
Other	3	30%
How many kilo grams of butter are collected per week		
100-200 Kg	3	30%
Depending on supply	7	70%
Where do you sell		
Butter shop	10	100%
Materials used for transport butter		
Koba (dried inset leaf)	10	100%

Kg= kilo gram

4.17. Market information and preference butter of the study area

Source of market information in study area, over all respondents get marketing information from traders, the price butter rises more during holy days, market preference of butter of the study area is Very high by ,this means that consumer preference also very high. Indicator of good quality butter of the study area 50% Good color and flavor and 50 % were Good texture and price. However, opposing study report on market information by Lina *et.al*, (2016) source of information on animal product handling and timely market prices, 55.3% of farmers are informed through agriculture office and professionals and 39.5% relay on neighbours. It clearly indicates that media like radio (3.3%) and newsletter (1.3%) are not reachable to the area and traditional ways of communication are still prevailing in Menz district.

Table 15. Market information and preference of butter in the study area.

Variable	Frequency	Percent (%)
Where do you get marketing information?		
Traders	10	100%
what time does the price of butter rise		
During holydays	10	100%
Market preference of butter		
Very high	10	100%
Indicator of good quality of butter		
Good color and flavor	5	50%
Good texture and price	5	50%
Problem of marketing period		
Yes	10	100%
Which months?		
Fasting month's	10	100%
Specify the frequency of selling butter in a month		
Always	6	60%
Always except Sunday	4	40%
You ever experienced problem due to lack of market		
Yes	8	80%
No	2	20%
Process butter further into other products		
No	10	100%

4.18. Butter consumption

It is better households follow diversified consumption of milk products for better nutrition, as the study result showed that majority of respondents in study district consume butter, they consume minimum of 1-2 kg and maximum 3-5 kg of butter on every month per household. In the study area frequency of butter consumed in household 64%, 12% and 12% where daily, during holy days and twice a week respectively. How they consume, the majority consumers reported 92% were after boiling or they use ghee and the remaining consume 4% and 4% raw and fermented respectively. Consumer preference of the butter of study area was very high.

The range of amount of butter consumed per household partially agree with the study of Tsedey and Bereket (2016) who reported that butter consumed per week is 2.94 K.g in South Nations Nationalities and People's Region. On the other hand, Asaminew (2007) who reported in Bahir Dar the limited consumption of butter may be due to the higher price associated with it and the need for cash income to buy some necessities. Butter can fetch a good price compared to other milk products. Butter was consumed only during holidays and special occasions in rural low-income households because it fetches routine cash income.

Table 16. Butter consumption in study area.

Variable	Frequency	Percent (%)
Consume butter in your home		
Yes	50	100%
Amount in kg/month		
1-2kg	46	92%
3-5kg	4	8%
Frequency of butter eaten		
Daily	32	64%
Once a week	2	4%
During holidays	6	12%
Twice a week	6	12%
Others	4	8%
How do you consume butter		
Raw	2	4%
After boiling	46	92%
After souring	2	4%
Do you consume butter		
yes	50	100%
Consumer preference of butter		
Very high	38	76%
High	12	24%

Kg= kilo gram

4.19. Challenge of butter consumption.

The results concerned with butter adulteration in study area are described in table 17. About 48% of the respondent consumers stated that butter in the market for consumption is adulterated. However, almost all of the respondents stated that high level of adulteration occurs at retailer level. Consumers generally prefer to source butter directly from producers or from outlets that they trust to guarantee the quality and safety of the butter they buy. The major type of adulteration that reported by consumers were 62.5% banana and 37.5% ‘shenolega’ in the study area. The problem is also slight similar with (Lina *et al*, 2016) at Debre Berhan district, 22.5% and 36.7% of Mehal Meda and Molale respectively found banana and flour added in the butter the area.

Methods to determine butter quality in the areas, Butter quality is linked with method of handling butter, addition of foreign materials and other environmental factors. About 24%, 16% and 8% of respondents stated that they locally determine quality of butter by filtering, smelling and painting on the skin respectively in the study area.

Table 17. Butter Adulteration problem in study area.

Variable	Frequency	Percent (%)
Adulteration problem		
Yes	24	48%
No	26	52%
Local butter quality determination methods		
Filtering	12	24%
Smelling	8	16%
Painting	4	8%
More adulterated		
Retailer	24	100%
Type of adulteration	(%)	(%)
With Banana	15	62.5%
With Shenolega	9	37.5%

4.20. Butter prices in study areas

The price result shown in table 18 below. According to respondents price of butter were rise during holy-days, non-fasting period and dry season. Producers reported that they sell average price 208.15 ETB/kg of butter to retailers, retailers sell average price 243.0 ETB/kg of butter to butter shops and they sell average price 249 ETB/kg of butter to different consumers and lastly consumers reported that they buy average price 254.18 ETB/kg of butter during holydays. Similar report by (dairy camber report, 2016) butter sold at Birr 150 to160 prices on average ranging from 95 to 240 Birr per Kg depending on the season and location.

Generally butter price rise more during holidays than the rest of season the reason behind this is majority of people in Ethiopia consume butter during holy days.

In Ethiopia, studies indicate that butter prices differ from place to place, with seasonal variability because of feed shortage in dry season that hinder production of butter. This result is in line with Amistu *et al.*, (2016) who stated the average price for butter as 155ETB birr/kg in Wolaita zone. The average price of a Kg of butter during holidays, dry season and non- fasting season rise more as compared with non-holidays, wet season and fasting season. The result also similar with (Lina *et al.*, 2016) at Debre Berhan district butter mean price of 127.68, 131.75 and 112.93 birr per kilogram of butter in Mehalmeda, Molale and Zemero respectively. Slightly similar price of butter was also recorded (Gebremedhin *et al.*, 2014) which is ETB 112.75/kg. Concerning the season almost all (99.3%) believe there is a seasonal variation in the price of the butter at the market dry season being the time when butter price gets sky-scraping.

The overall result in the current study indicates that the butter prices were slightly higher during dry period of the years. This might be due to scarcity of livestock feed during dry season which results in low milk yield and low butter production. The low milk yield and butter production in the study area during dry season was due to very poor management and trend to avail livestock feed for dry season under smallholder. Moreover, Sintayehu *et al.* (2008) mentioned that most traditional and religious holidays occur during the dry season that further aggravates the price of butter in addition to the feed limitation.

Table 18. Price of Butter in study area.

		Butter Prices ETB/Kg			
		Minimum	Maximum	Mean	Std. Error
Market actors	Marketing season				
Producers	Fasting period price	125	200	161.32	1.416
	Non-fasting period price	150	230	182.21	1.34
	Holy days	150	270	208.15	2.241
Retailers	Fasting period price	150	250	186.75	3.385
	Non-fasting period price	190	280	235.75	3.056
	Holy days	200	260	243.0	2.1243
Butter shops	Fasting period price	190	240	215	5.217
	Non-fasting period price	240	270	249	2.768
	Holy days	240	280	250	4.422
Consumers	Fasting period price	150	260	190.2	2.498
	Non-fasting period price	200	300	245.5	2.858
	Holy days	210	300	254.18	2.27

ETB/Kg Ethiopian birr/kilo gram, Std. Error = standard error

4.21. The quality attributes of butter preferable by markets and consumers

Some of the criteria (such as color, smell, flavor and fermentation of butter) were physically observable. (Jabbar *et,al* 2010). According to the respondents, Butter quality attributes preferred by consumers, are color, texture, flavor and fermentation (1st, 2nd 3rd and 4th,respectively in ascending order) preference by the market and consumer. This result of report is agree with the Asaminew, (2007) who reported, consumers /traders consider the colour, flavour, texture and cleanness of the products during transaction, that butter quality requirements fetch a good price. During the dry seasons butter price increase, this is related to decreased milk yield of cows due to the insufficient feed supply. Higher price was also paid for yellow coloured and hard textured butter that deemed to be higher in dry matter in Bahir Dar area. It also agrees with the report by (Lina *et,al* 2016) who reported 79.8% respondents use color, taste and odor as a parameter to choose quality butter in the market of Menz district

But consumers report shows 44% flavor, 32% texture, 20% color and remaining 4% fermentation were preferable by consumer in study area.

Respondents preferred butter with good flavor, yellowish and thick/hard butter to that with bad flavor, a white color and watery/soft butter. Respondents generally equated butter with good flavor, yellowish color and thick/hardness consistency with butter which was more preferred than butter with bad flavor, white color and watery/soft consistency which was associated with lower quality. The study agrees with the study at Menz district by (Lina *et,al* 2016) reported test and color are the criteria mostly used to examine the quality of butter in Mehal Meda (60.7%) and Zemero (70%). But those in Molale rely on color alone to choose their quality butter. Moreover, the color of butter is also another tool they used as a quality measure. “Butter which is white in color is not desirable at all because it is made by churning with hot water it doesn’t

weight though the hot water makes it easier to churn and produce butter. Rather the yellow butter which is made by churning in cold water produces a good quality butter which weighs good, yellow in color and much demanded.

However, slight opposing data results of the survey by Mohammad A. *et al*, 2010) who show that among the local butter quality and safety attributes, consumers gave weight to in case of local butter the order was purity, hygiene, freshness, price and origin of butter in Addis Abeba Ethiopia.

Table 19. Preferable Quality attributes butter in study area.

Actors	quality parameters	quality attributes of butter	
		Frequency	percent (%)
Producers	quality attributes		
	Color	62	44.9%
	Flavor	32	23.2%
	Fermentation	8	5.8%
	Texture	36	26.1%
Retailers	Color	18	45%
	Flavor	8	20%
	Fermentation	3	7.5%
	Texture	11	27.5%
Butter shops	Color	4	40%
	Flavor	4	40%
	Fermentation	1	10%
	Texture	1	10%
Consumers	Color	10	20%
	Flavor	22	44%
	Fermentation	2	4%
	Texture	16	32%

5. CONCLUSION

The traditional cattle production system practiced in Kinddo Didaye district is composed of crop livestock mixed production system. In study district different livestock species were found, Butter production is the long-life activity. Butter production is the main income source from dairy in the study district. Local breeds were most dominant milking cows and source of butter in study area. They store and churn milk and milk by product by clay pot/Ensra. All of the producers have mentioned that there was no modern butter making and storing equipment and this indicated that butter making practices and materials used were all traditional, time consuming and had lower processing efficiency. Cleaning milking utensil by washing and smoking; the plant spices for this purpose were kosorote (*ocimumhaardiense*) and tejsar (*cymbopogan martin*) and others. Butter is the main income source from the dairy. Households produce butter for different purposes; majority of reported that butter for sell and home consumption and in some cases they offer to relatives and neighbours as a gift. Factors such as, volume of milk churned at a time, length of churning time, butter yield from a given milk and volume of milk produce 1kg butter, statistically there was a significant difference ($p<0.05$) between agro-ecologies on the parameters which involved in butter making. The length of churning time, quantity of butter produced were significantly higher ($p<0.05$) in midland agro-ecology than in lowland; whereas volume of milk required to produce 1 kg of butter were significantly higher ($p<0.05$) in low land than in midland agro-ecology. The challenges of butter production in the area were feed shortage, shortage of grazing area, dry season, price fluctuation and fasting season. Retailers and consumers got quality butter from producer, the quality attributes of butter preferable by consumer and market were color, texture, flavour and fermentation. The major type of adulteration that reported by consumers were banana and Shenolega. The price of butter rise during holy days, non-fasting period and dry season.

6. RECOMMENDATION

- Dairy producers and butter cooperative should be established by relevant bodies in the area that helps for the development of formal butter marketing and enhancing quality of the product in the study district.
- All butter producer and traders should be licensed and trained by the stakeholders to reduce the problems related to butter quality in the market.
- Attention should be given to reduce constraints through training and active participation in planning and implementation of the dairy, butter production and marketing development projects and at alleviating food security problem in the study area.

The possible intervention points to improve butter production of the district are:

- Improving Artificial Insemination (AI) service can help to improve the butter production
- Training farmers on modern feed production, better feeding and management practice can bring change in the scale of butter production as well as quality butter for consumers.
- Organizing butter producers and marketing cooperatives.
- Setting-up of a quality assurance system for the production up to consumption and,
- Promotion of butter producer and marketing associations
- Government should be trying to full requirement of extension service and electric power to use modern butter churning machine in different rural areas.
- Finally, future research should focus on chemical components and nutrient contents of kindo Didaye butter and long term dairy development.

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APPENDIX

1. Questionnaire used to collect data for Butter Production

1. General information about households

Enumerators name _____ Date of interview-----

1.1. Kebele _____

1.2. Household head name _____

1.3. Household head gender 1. Male 2. Female

1.4. Household age: _____

1. 20-30 2. 31-40 3. 41-50 4. 51-60 5. >61

1.5. Household size 1=. 2, 2= 3-5, 3.= 6-9, 4=. Above 9

1.6. Level of education of the household head (encircle one)

1. Illiterate 2. Basic Education 3. Elementary School 4. Junior Secondary education

5. High School 6. Higher Education 7. Religious Education

1.7. Age group of Family members. 1. 0-14 2. 15-30 3. 31-64 4. >65

1.8. Educational status house hold members

Category	Educational level			
	Illiterate	1-8Grade	8-12 Grade	>12 Grade
Male				
Female				
Total				

1.9. Religion of household head. 1. Protestant b. Orthodox 3. Apostle 4. Others

Milk production system in the study area

2.0. Major income source

1. crop production
2. livestock production
4. trade
5. Labor force
6. Other-----

2.1. Source of milk consumed in the house-hold

1. Home produced
2. Neighbor milk producers'
3. Dairy cooperatives
4. Other

2.2. Animal species managed in the farm as source of milk.

1. Cow
2. Sheep
3. Goat
4. others

2.3. Breed of milking cow. 1. Local breed 2. Cross breed

2.4. Number of livestock kept in farm by type, sex & age

	Livestock type		Breed type		Total	age	remark
			Local	Cross/exotic			
1	Calves(<1year)	Male					
		female					
2	Heifer						
3	Bulls						
4	Steers(castrated)						
5	Dry cows						
6	Pregnant cows						
7	Lactating cows						
8	Sheep						
9	Goats						
10	Equines						
11	Chicken						

12	Beehives	Traditional	Transitional	Modern			

3. Milk processing practices

3. Do you store milk? 1. Yes ____ 2, No ____

3.1. If yes for what purpose? 1. Sale 2. to process into other products

3.2. Means for storage. 1. Refrigerator 2. Traditional cooling system.....

3. If others

3.3. Materials used for milk storage.

1. clay pot/ensira 2. kele 3. Plastic 4.others

3.4. Do you clean milk storing containers? 1. yes 2 .no

3.5. If yes, methods of cleaning 1. Washing 2. Smoking 3.others -----

3.6. Frequency of cleaning 1. Daily 2. Twice a day

3. Only when using 4. Others.....

3.7. Time of cleaning 1. before every use 2. after every use 3. when necessary

3.8. Source of water for cleaning milk storing containers

1. tap water 2. hand dug well water 3. River 4.others.....

3.9. Type of plants used for cleaning milk containers 1. Kosorote (ocimumhaardiense)

2. Tejsar (Cymbopogan martini) 3. Tenadem (Rutachalepensis)

4. Woyira (Olea africana) 5. Mudha(local name) 6. Gulluwa (local name)

7. caaccuwa(local name) 8.Hokuwa (local name) 9.others

4. Butter making/production questionnaire

4.1. What do you prefer to use butter? 1. yes 2. no

4.2. What is the main source of income from dairy?

1. Butter 2. Milk 3.others-----

4.3. Do you make butter? 1. yes 2. no

4.4. For butter making how long you collect milk?

1. Daily milk 2. Two days 3.three days 4.four days 5. others-----

4.5. Do you measure the amount of milk that you are going to use for butter making?

1. Yes 2. No

4.6. If you measure how? 1. by litter 2. by balance 3. Others.....

4.7. Volume of milk churned at a time?(by litter) -----

4.8. Churning time (minutes)? -----

4.9 Butter produced (by gram)? -----

4.10. Volume of milk to produce 1 kg of butter (by litter) ? -----

4.11. Do have any modern butter making method in your area other than churning?

1. Yes 2. No

If yes who provided the method/machine.....

4.12. If yes do you use the method? 1. Yes 2. No

5.0 If yes is there any difference between traditional and modern method? 1. Yes 2. No

5.1. If yes in what? 1. Yield 2. Churning time 3. quality/ acceptance

4. Others

5.2. After making butter, what do you do with it?

1. Sell 2. home consumption 3. Others-----

5.3. If you sell butter, do you feel about quality? 1. Yes 2. No

5.4. Does the market prefers or accepts of your butter? 1. yes 2. No

5.5. What is the quality attributes that makes your butter preferable in markets?

1. Color 2. flavor 3. Fermentation 4. Texture 5.other-----

5.6. Why does market prefer your butter or what makes your butter unique?

1. feeds that dairy animal feeds on 2. breeds of dairy cattle
3. agro-ecology 4. animal husbandry 5. Others-----

5.7. What are the feeds of your dairy cattle?

1. Only grass 2. Grass and concentrate 3. Grass and local spices to improve butter production 4. Others-----

5.8. How do you sell your butter?

1. Assembler 2. Open markets 3. Hotels 4. Retailers.....

5.9. what is the market price per kilo butter

No. Item	Price(Birr)/kg during	
	Fasting period	Non-fasting period
1. Butter		

5.10. What are the main challenges of butter production? (Rank)

1. lack of quality feeds 2. Grazing area shortage 3. Disease 4. market price fluctuation
5 Veterinary clinic 6. others-----

5.11. What are the main challenges of butter marketing? 1. Price fluctuation 2. fasting date

3. kilo gram problem 4. others-----

5.12. Do you process butter further into other products? 1. Yes 2. No

5.13. If yes what type of product? 1. ghee 2. others.....

5.14. To process butter do you use spices or plant materials? 1. Yes 2. No

5.15. If yes what type of spices or plant materials?

1. Spices going to be used for processing butter

.....
.....
.....
.....

2. Plant materials going to be uses for processing butter

.....
.....
.....
.....

5.6. What is the purpose of using spices/plant materials?

1. Improve taste 2. Increases shelf life 3. Improve texture 4. Other

5.7. Containers used for butter making/churning

1. Clay pot churn 2. Plastic churn 3. Gourd/kele 4.Others

5.8. Do you store/preserve butter before sell? 1. yes 2. no

5.9. If yes how long do you store?

1. one week 2.two weeks 3.three weeks 4. one month 5. two months 6. five months

7. others.....

6.0. Containers used for butter storage?

1. Clay pot 2. Plastic 3.Gourd 4. Dried thin stem of Inset(gobba)

5. Others.....

6.1. Do you clean containers you use for butter and making/storage 1. Yes 2. No

6.2. If yes how? 1. Washing 2. Smoking 3.boiling 4.others-----

6.3. What are the smoking materials?

.....
.....
.....
.....

6.4. What is the purpose of smoking?

1. Improve taste 2. Increases shelf life 3. Improve texture

4. others.....

6.5. Water source for cleaning?

1. tap water 2. Well 3. River 4.others.....

2. Questionnaire used to collect data from Retailer

• Enumerators name _____ Date of interview-----

1.1. Kebele _____

1.2. Name of interviewee _____

1.3. Gender 1. Male 2. Female

1.4. Age: _____

1.5. Level of education of the household head (encircle one)

- 1. Illiterate 2. Basic Education 3. Elementary School 4. Junior Secondary
- 5. High School 6. Higher Education 7. Religious Education

Questions

1. Experience in butter trading. 1. 1-5years 2.6-10 years 3.>10 years
2. Source of your butter? 1. from producer 2. from cooperatives 3. others.....
3. From which sources you get quality butter? 1. Producer 2. other
4. What is the quality attributes that makes your butter preferable by consumers?
 - 1. Color 2. flavor 3. Fermentation 4. Texture 5. other-----
5. Which quality attributes receives more price? 1. By fermentation
 - 2. Bycolor 3. By flavor 4. By texture 5. others
6. Who is main buyer of your butter?
 - 1. Hotels 2. Home consumers 3. Assembler 4. Others-----
7. Where is the destination of your butter?
 - 1. WolaitaSoddo 2. Hawassa 3. Addis Abeba 4. Other -----
8. What is the price of butter per kilo gram? -----

item	Fasting season	Non fasting season
Butter price/kilo gram		

item	Holy days	Non holy season
Butter price/kilo gram		

9. At what time the price of butter rise? (rank)
 - 1. During holydays 2. dry season 3. Throughout the year
 - 4. Fasting season 5. Others-----

10. What are major challenges by your sector?

3. Questionnaire used to collect data from /butter shops

Enumerators name _____ Date of interview-----

1.1. Kebele _____

1.2. Name of interviewee _____

1.3. Gender 1. Male 2. Female

1.4. Age: _____

1.5. Level of education of the household head (encircle one)

1. Illiterate 2. Basic Education 3. Elementary School 4. Junior Secondary
5. High School 6. Higher Education 7. Religious Education

Questions

11. Experience in butter trading. 1. 1-5years 2.6-10 years 3.>10 years

12. Do you collect butter for sale? 1. Yes 2. No

13. If yes, how many days you collect for sale?

1. 2 days 2.3 Days 3.4 days 5. Others-----

14. Source of butter?

1. from producer 2. from cooperatives 3. Retailer 4.other.....

15. Does the consumer prefers or accepts of your butter? 1. yes 2. No

16. What is the quality attributes that makes your butter preferable by consumers?

1. Color 2. flavor 3. Fermentation 4.Texture 5.other-----

17. How do you get quality butter?

1. By increasing price 2. By going to farm 3. Others-----

18. How many kilo grams of butter are collected per week?

1. <10 Kg 2.>10 Kg 3.50- 100 Kg 4.100-200 Kg 5. Others-----

19. Where do you sell? 1. Butter shop 2. Local markets 3. hotels

4. Big traders 5. Others.....

20. How do you transport butter to the market?

1. on foot 2. by cart 3. by public transport 4. others.....

21. What materials do you use transport butter?

1. plastic 2. koba. 3. metal containers 4. clay pot 5. others-----

22. From where do you get marketing information? 1. Extension agent 2. Neighbors

3. Personal visit 4. Mass media 5.Traders 6.others.....

23. At what time does the price of butter rise?

1. during holydays 2. dry season 3. throughout the year

24. How is market preference of KinddoDidaye Butter?

1. very high 2. high 3. Medium 4. Others-----

25. What is the price of KinddoDidaye Butter per kg?

No	Item	Price(Birr)/kg during	
		Fasting period	Non-fasting period
1.	Butter		
2.		Holy-days	Non-holydays

26. What is the indicator of good quality of KinddoDidaye Butter?

27. Is there any period that you have problem of marketing your butter? 1. Yes 2. No

28. If yes, which months?

1. Fasting month's 2. In any month of the year

3. Specify -----

29. Please specify the frequency of selling butter in a month _____

30. Have you ever experienced problem due to lack of market?

1. Yes 2. No

31. Do you process butter further into other products? 1. Yes 2. No

32. If yes, what type of product? 1. ghee 2. others

33. To process butter, do you use spices or plant materials? 1. Yes 2. No

34. If yes, what type of spices or plant materials?

1. Spices

2. Plant materials

.....
.....
.....
.....

35. For how long can you store butter with minimum spoilage? _____

36. What methods do you use to minimize spoilage of butter? _____

37. Do you clean butter store? 1. Yes 2. No

38. If yes, what is the purpose of cleaning?

- 1. Improve taste
- 2. Increases shelf life
- 3. Improve texture
- 4. All
- 5. others.....

Market problems

39. Do you ever have difficulties selling your butter? 1. Yes 2. No

40. If yes, what are the difficulties? 1. Poor quality of butter 2. No market

- 3. Low price
- 4. Lack of transportation
- 5. Other, please specify.....

41. What are the major challenges of butter marketing?

42. What are the ways you use to improve butter marketing? 1. By advertising

- 2. By other methods-----

4. Questionnaire used to collect data from consumers

Enumerators name _____ Date of interview-----

1.1. Kebele _____

1.2. Name of interviewee _____

1.3. Gender A. Male B. Female

1.4. Age: _____

1.5. Level of education of the household head (encircle one)

- 1. Illiterate
- 2. Basic Education
- 3. Elementary School
- 4. Junior Secondary

5. High School 6. Higher Education 7. Religious Education

Questions

1. Amount in kg/month. 1.1-2kg 2. 3-5kg 3. Above 6 kg
2. Do you consume butter in your home/hotels? 1.Yes 2. no
3. How frequently is butter eaten by this household/hotel?
 1. daily 2. once a week 3. during holidays 4. twice a week 5. others.....
4. How do you consume butter? 1. Raw 2. After boiling 3. After souring 4. Others-----
5. Do you consume/ use kinddoDidaye butter? 1. Yes 2. no
 If your answer is " yes" please answer the following questions.
6. How is consumer preference of KinddoDidaye Butter?
 1. Very high 2. High 3. Medium 4. Poor 5. Others
7. What is the price of KinddoDidaye Butter per kg?

No	Item	Price(Birr)/kg during	
		Fasting period	Non-fasting period
1.	Butter		
2.		Holy-days	Non-holydays

8. What are the main quality attributies of KinddoDidaye Butter? (rank)
 1. Color 2. flavor 3. Fermentation 4.Texture 5.other
9. Is there problem/challenge in KinddoDidaye Butter consumption? 1. Yes 2. no
 What type of problem/challenges?

10. Do you have the materials to check this problem? 1. Yes 2. no
11. If yes what type of material?

- -----
12. Adulteration problem? 1.yes 2.no
 13. Local butter quality determination method. 1. Filtering 2. Smelling 3. Painting
 14. More adulterated butter source 1.producer 2. retailer 3.assemblers
 15. Type of adulteration. 1.With Banana 2.With Shenolega 3.others

Thank you!

Appendix table 1. Selected kebele total population and sample size

No	Kebele	Total population	Sample size	Required
1	BossaBorto	8954	$8954 * 138 / 42623 = 28.9$	29
2	ShelaMekera	4987	$4987 * 138 / 42623 = 16.14$	16
3	Zebo	9393	$9393 * 138 / 42623 = 30.41$	31
4	Bereda	5639	$5639 * 138 / 42623 = 18.25$	18
5	Zaro	7448	$7448 * 138 / 42623 = 24.1$	24
6	Gocho	6202	$6202 * 138 / 42623 = 20.08$	20
	Total Population	42,623		138

Source: (Kinddo Didaye Woreda Adm. Office 2010 E.C).

Appendix table 2. Conversion of Livestock number to Tropical Livestock Unit (TLU)

Livestock types	TLU /LLU
Local oxen/bulls	1.1
Cross bred oxen/bulls	1.9
Local cows	0.8
Crossbred cows	1.8
Local heifers	0.5
Crossbred heifers	0.7
Local calves	0.2
Crossbred calves	0.4
Sheep	0.1
Goats	0.1
Horses	0.8
Donkeys	0.5
Poultry	0.01

Source: (Bekele, 1991; Gryseels, 1988; ILCA, 1990).

Appendix table 3. Retailer/respondents information

Variable	Frequency	Percent (%)
Kebele		
From Kindo Didaye	40	100%
Gender		
Female	40	100%
Age		
15-25	5	12.5%
26-35	23	57.5%
36-45	12	30%
Level of education		
Illiterate	2	5%
Basic Education	10	25%
Elementary School	14	35%
Junior Secondary	2	5%
High School	10	25%
Higher Education	2	5%

Appendix table 4. Butter shop respondents' information

Variable	Frequency	Percent (%)
Experience in butter trading		
6-10 years	2	20%
>10 years	8	80%
Place/kifleketema		
Merkato	1	10%
Mehal	6	60%
ArogeArada	3	30%
Gender		
Male	10	100%
Age		
26-35	2	20%
36-45	8	80%
Level of education		
Elementary School	1	10%
High School	8	80%
Higher Education	1	10%

Appendix table 5. Consumer information

Variable	Frequency	Percent (%)
Kebele		
From kinddo	40	80%
From soddo	10	20%
Gender		
Male	35	70%
Female	15	30%
Age		
26-35	15	30%
36-45	31	62%
above 46	4	8%
Level of education		
Illiterate	2	4%
Basic Education	2	4%
Elementary School	12	24%
High School	24	48%
Higher Education	10	20%



Figure 2. Butter shop 1



Figure 3. Butter shop 2



Figure 4. Butter handling system by dried inset stem (locally Gobba)



Figure. 5 Plant spices to clean



Figure 6 . Milk storing and churning utensils in Kinndo Didaye district.

BIOGRAPHICAL SKETCH

The author was born in 1983 E.C in Kinddo Didaye woreda, Wolaita Zone of SNNPR, Ethiopia. He attended primary education in Zaro Hamus Elementary school, junior school in Ligaba Beyene and secondary and high school education in Wolaita Soddo Secondary and Preparatory school. The author joined Jigjiga University in December, 2011 and graduated with BSc degree in Animal and Range Sciences on 29, June 2013. He worked in Agriculture and Rural Developments Office of the Kinddo Didaye wereda, Wolaita Zone of SNNPR as a rural job innovation expert from July 2013 up to January 2015. Currently, He is working as Assistant Lecturer in Wolaita Soddo Agriculture Technical and Vocational Education Training (ATVET) College, Wolaita zone, from January 2015 up to present. Then in July 2017, he joined the School of Graduate Studies at Hawassa University in summer program to pursue his MSc study in Animal production.